pp. 97–184] [February, 1943

TROPICAL DISEASES BULLETIN

IMPERIAL MYCOLOGICAL INSTITUTE
1 MAR 1943

VOL. 40.] 1943. [No. 2.

MAIN CONTENTS

	PAGES
Summary of Recent Abstracts II.—Yellow Fever	97–101
Malaria	101–119
Trypanosomiasis	120
Leishmaniasis	120–125
Fevers of the Typhus Group ...	125–137
Bartonellosis	137–138
Plague	139
Cholera	139–141
Bacillary Dysentery	141–144
Amoebiasis and Intestinal Protozoal Infections	144–148
Yaws	148–149
Leprosy	149–155
Helminthiasis	155–167
Deficiency Diseases	167–170
Sprue	170
Haematology	170–172
Venoms and Antivenenes ...	172–173
Dermatology and Fungous Diseases	173–177
Miscellaneous	177–182
Book Review	182–184

For detailed Contents see pp. ii, iii, iv, v and vi.

Issued under
the Direction of the
Honorary Managing Committee of the
BUREAU OF HYGIENE AND TROPICAL DISEASES,
Keppel Street, London, W.C.1.

Price 2/6 Net.] *Entered as Second Class Matter in the U.S.A. Post.* [Annual Subscription 21/-.

HONORARY MANAGING COMMITTEE

APPOINTED BY THE SECRETARY OF STATE FOR THE COLONIES.

Chairman : A. G. H. Smart, *C.M.G.*, *M.B.E.*, M.D., D.P.H., D.T.M. & H. (*Chief Medical Adviser to the Secretary of State for the Colonies*).

Wm. Horner Andrews, D.Sc., M.R.C.V.S.

Sir Wilson Jameson, *K.C.B.*, LL.D., M.D., F.R.C.P. (*representing the Ministry of Health*).

Sir Arthur Horn, *C.M.G.*, M.D., M.R.C.P., D.T.M.

Professor Sir John Ledingham, *C.M.G.*, LL.D., D.Sc., M.B., F.R.C.P., F.R.S. (*representing the Royal Society*).

G. Carmichael Low, M.D., F.R.C.P.

Sir Philip Manson-Bahr, *C.M.G.*, *D.S.O.*, M.D., F.R.C.P., D.T.M. & H.

Major-General Sir Ernest W. C. Bradfield, *K.C.I.E.*, I.M.S. (retd.).

Sir Edward Mellanby, *K.C.B.*, M.D., F.R.C.P., F.R.S., K.H.P. (*representing the Medical Research Council*).

Lt.-Col. G. S. Parkinson, *D.S.O.*, M.R.C.S., L.R.C.P., D.P.H., R.A.M.C. (retd.)

The Honourable E. Baring (*representing the Foreign Office*).

J. B. Sidebotham (*of the Colonial Office*).

Secretary : C. A. Grossmith, *of the Colonial Office*.

STAFF OF THE BUREAU :

Acting Director : Charles Wilcocks, M.D., D.T.M. & H.

Secretary : R. L. Sheppard.

LIST OF ABSTRACTERS IN THIS ISSUE.

Mary G. Blacklock, B.Sc., M.B., Ch.B., B.A.O., D.T.M.

Professor P. A. Buxton, M.A., M.R.C.S., L.R.C.P., D.T.M. & H. (*Sectional Editor*).

C. C. Chesterman, *O.B.E.*, M.D., M.R.C.P., D.T.M. & H.

L. J. Davis, M.D., M.R.C.P.

Professor H. N. Green, M.D., M.Sc.

Lt.-Col. W. F. Harvey, *C.I.E.*, M.B., F.R.C.P.E., D.P.H., I.M.S. (retd.) (*Sectional Editor*).

F. Hawking, D.M., D.T.M.

G. Lapage, M.D., M.Sc.

Sir Philip Manson-Bahr, *C.M.G.*, *D.S.O.*, M.D., F.R.C.P., D.T.M. & H.

Maj.-Gen. Sir John W. D. Megaw, *K.C.I.E.*, D.Sc., M.B., B.Ch., I.M.S. (retd.) (*Sectional Editor*).

Maj.-Gen. Sir Leonard Rogers, *K.C.S.I.*, *C.I.E.*, M.D., F.R.S., I.M.S. (retd.) (*Sectional Editor*).

Sir H. Harold Scott, *K.C.M.G.*, M.D., F.R.C.P., D.P.H., D.T.M. & H.

Sydney Thomson, M.D., F.R.C.P., F.R.S.E. (*Sectional Editor*).

C. M. Wenyon, *C.M.G.*, *C.B.E.*, M.B., B.S., B.Sc., F.R.S. (*Sectional Editor*).

V. B. Wigglesworth, M.D., B.Ch., F.R.S.

F. Norman White, *C.I.E.*, M.D., D.P.H., I.M.S. (retd.) (*Sectional Editor*).

BOOKS

H. K. LEWIS & Co. Ltd.

MEDICAL PUBLISHERS AND BOOKSELLERS

LARGE STOCK OF TEXTBOOKS AND RECENT LITERATURE
IN ALL BRANCHES OF MEDICINE AND SURGERY

Foreign Medical and Scientific Books not in stock obtained under Licence.

To Colonial Libraries, Colleges and similar Institutions, and to residents in India, South Africa, Australia, etc., the publications of any publisher can be supplied. Books advertised or reviewed in this Journal can be supplied to order.

DEPARTMENT FOR SECOND-HAND BOOKS—140 GOWER STREET
Please state interests when writing.

Medical & Scientific Lending Library

Close to Euston Square Station (*Metropolitan Railway*), Warren Street Tube Station.

ANNUAL SUBSCRIPTION
Town or Country from One Guinea.

The **Library Catalogue,** revised to December 1937 with Supplement 1938–1941, containing classified index of authors and subjects, **20s.** net. (to subscribers, **10s.** net). Supplement separately, **4s.** net (to subscribers, **2s.** net), postage **8d.**

Prospectus post free on request.

BI-MONTHLY LIST of NEW BOOKS and NEW EDITIONS added to the Library post free on application

136 GOWER STREET, LONDON, W.C.1
Telegrams: "PUBLICAVIT, WESTCENT LONDON." Telephone: EUSton 4282 (5 lines)

LIVERPOOL SCHOOL OF TROPICAL MEDICINE

UNIVERSITY OF LIVERPOOL.

Courses of Instruction.

Arrangements have been made with the London School of Hygiene and Tropical Medicine and with the Colonial Office that, for the duration of the war, courses of instruction in tropical medicine and hygiene will be held alternately in London and Liverpool. The next courses for the Diplomas in Tropical Medicine and Tropical Hygiene will commence on a date to be announced later.

Prospectus from the Laboratory Secretary, School of Tropical Medicine, Pembroke Place, Liverpool, 3.

Treatment of Patients.

There is an out-patient department at the School for all sufferers from diseases contracted in the tropics. Cases needing hospital treatment are admitted to the Tropical Ward (general and private wards) of the Liverpool Royal Infirmary, which adjoins the School. Special arrangements are made for Civil Servants and for members of certain firms who are regular subscribers to the School.

Vol. 40. No. 2.] CONTENTS [February, 1943

PAGE

Summary of Recent Abstracts. II. Yellow Fever 97–101

MALARIA.

BARLOVATZ ... ... New Index of Malaria Transmission in an Endemic Locality 101
SCHWETZ ... ... Note on Malaria in Irumu (Ituri, Belgian Congo) 102
SCHWETZ & BAUMANN... ... ... Note on Malaria in a Village near Coquilhatville and in Bikoro on Lake Tumba 103
BOURGUIGNON ... ... Notes on Malaria in Elisabethville ... 103
NICOLAY ; SCHWETZ ... ... Malaria in Boma in 1938 and 1939 ... 104
COLLIGNON ... ... The Anti-malarial Campaign of 1939 in Algiers 105
SIEGFRIED & IZAC ... ... Malaria in Laghuat, Algeria 105
RUSSELL & JACOB ... ... Epidemiology of Malaria in the Nilgiris District, Madras Presidency 105
MUMFORD ... ... Mosquitoes, Malaria and the War in the Pacific 107
SÚTTER & ZÚNIGA ... ... Malaria Survey of El Salvador, Central America 107
KUMM & ZÚNIGA ... ... The Mosquitoes of El Salvador 108
KITCHEN & PUTNAM ... ... Mechanism of the Parasite Cycle in *Falciparum* Malaria 109
ROUBAUD, CHORINE & GUIRAUD ... Unsuccessful Attempts to transmit an Old Inoculation Strain of *P. vivax* by Anopheles 109
SAUTET ... ... Anopheles of Syria and Lebanon in Relation to Malaria 110
DE MEILLON ... ... Entomological Studies in the Colony of Mozambique 110–111
ROCKEFELLER FOUNDATION ... ... The Death of the *Gambiae* in Brazil ... 112
ROY & BISWAS ... ... Importance of *A. pallidus* as a Carrier of Malaria in Udaipur State, Central Provinces 112
TOMITA ... ... Spectroscopic Examination of the Urine in Malaria... 113
RAO ... ... Effect of stocking Ricefields with Sullage on Anopheline Breeding at Khurda Road 113
RUSSELL, KNIPE & RAO ... ... Intermittent Irrigation of Ricefields to control Malaria in South India ... 114
RAO & RAMOO ... ... Practical Aspects of Mosquito Control in Wells and Tanks by Larvivorous Fish 114
RAO & RAMOO ... ... Control of Mosquito-Breeding in Canal Distributaries by growing certain Plants on their Banks 115
KNIPE & RUSSELL ... ... Observations on the Automatic Distribution of Paris Green 115
KNIPE & SITAPATHY ... ... Notes on Improvements made to Equipment for Spray-Killing of Adult Mosquitoes 116
MUDROW ... ... Clinical and Parasitological Findings and Chemotherapeutic Results in Fowl Malaria 116
CORRADETTI ... ... Pathology of Malaria in the Light of our Knowledge of the Comparative Biology of the Plasmodia 117
RUSSELL, MULLIGAN & MOHAN ... Active Immunization of Fowls against Sporozoites but not Trophozoites of *P. gallinaceum* by Injections of Homologous Sporozoites 117
RIGDON & THOMAS ... ... The Pathological Lesions in *P. knowlesi* Infection in *M. rhesus* Monkeys ... 118

Continued on p. iii.

Vol. 40. No. 2.] **CONTENTS**—*Continued from p.* ii. [February, 1943

MALARIA—*cont.*

		PAGE
RAY, MUKERJEE & ROY	Complement-Fixation Reaction in Experimental Animals in Response to *P. knowlesi* Antigen	118
RODHAIN & LASSMAN	Schizogony Cycle of *P. schwetzi* and Evolution of the Parasite in *A. maculipennis* var. *atroparvus*	119

TRYPANOSOMIASIS.

RODHAIN, VALCKE & VAN GOIDSENHOVEN	Diagnosis and Treatment of Trypanosomal Meningo-Encephalitis	120

LEISHMANIASIS.

KOWALZIG	Kala Azar in Spain	120
DRENOWSKY	Canine Leishmaniasis in the Petrich District, Bulgaria	121
BRAHMACHARI & BASU	Ulcerating Type of Dermal Leishmanoid with Pseudo-Arthritis and Ichthyotic Condition of the Skin	121
NAPIER, SEN GUPTA & SEN	Treatment of Kala Azar by Diamidino Stilbene	121
HENRY & GRINDLEY	Fluorescence and Adsorption of Stilbamidine and its Estimation in Biological Fluids	122
CUPI & CATTAPAN	Oriental Sore in Amara, Eritrea	124
MARCHIONINI	Treatment of Oriental Sore	125
GARZON & MOLINA	A Case of American Muco-Cutaneous Leishmaniasis	125

FEVERS OF THE TYPHUS GROUP.

SONNENSCHEIN	Typhus in Wartime	125
LEAGUE OF NATIONS: HEALTH SECTION. WEEKLY EPIDEMIOLOGICAL RECORD	Typhus in Germany	126
PRIMITIVO DE LA QUINTANA	Typhus Fever in Spain	126
CASTAÑEDA	The Aetiological Problem of Exanthematic Typhus	127
CASTAÑEDA	Bivalent Typhus Vaccine of High Immunizing Value	128
OTTO & BICKHARDT	Experimental Investigations into Protective Vaccines against Typhus Fever ...	129
KUNERT & BUCH	Experiences with the Weil-Felix Reaction	130
SCHÜTZ & MESSERSCHMIDT	Onset and Progress of the Weil-Felix Reaction during the First Ten Weeks in Typhus Fever. (Fig.)	132
TIETZ & CARLÉ...	A Rapid Typhus Reaction with the Dry Diagnostic Reagent, "Cracow." ...	133
BARTH	Study of *Proteus X19* in Experimental Typhus Fever	134
FERRO-LUZZI	Study of Leo Bürgher's Disease in Eritrea	135
MENDOZA	Exanthematic Typhus (Probably Murine) in Salvador	136
KERGER	The Various Types of Wolhynian Fever (Trench Fever)	136

BARTONELLOSIS.

HOWE	Demonstration of Agglutinins for *Bartonella bacilliformis*	137

Continued on p. iv.

PLAGUE.

		PAGE
GIRARD	New Characters Differentiating Plague and Pseudotuberculosis Bacilli from Pasteurella	139

CHOLERA.

GUINDY	Madras Cholera (Field) Enquiry	139
PANJA, MALIK & PAUL...	Examination of Cholera Vomit	140
CO TUI & WRIGHT	Preparations of Nonpyrogenic Infusion and Other Intravenous Fluids by Adsorptive Filtration	140

BACILLARY DYSENTERY.

MOGILNIZKY & BRUMSTEIN	The Pathology and Morbid Anatomy of Dysentery...	141
LYON	Sulphaguanidine in Treatment of Bacillary Dysentery...	142
BIBIKOVA	Treatment of Dysentery with Methylene Blue	143
SIEDEK	Disturbance of Small Intestine Function after Dysentery : Treatment	143

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS.

WESTPHAL	Experimental Amoebic Dysentery in the Rabbit	144
COUTTS & HERRERA	Urinary Amoebiasis due to *E. histolytica*	144
CAMERON & COLLINS	Intestinal Obstruction by Amoebic Granulomata	144
NIÑO	Amoebic Tumours of the Large Intestine	145
BERNE	Diagnosis and Treatment of Amoebic Liver Abscess	145
WESTPHAL	Culture Method for *E. gingivalis* and for its Differentiation from *E. histolytica* ...	147
RISSMANN	Intestinal Giardiasis in S. Poland... ...	147
HEADLEE	Intestinal Parasitism among In-Patients of the Indiana University Medical Center Hospitals	148
HEADLEE	Intestinal Parasitism among Students of Berea College, Kentucky	148

YAWS.

MASSE	Nodular and Ulcerative Dermatitis in Ubangi : Relationship to Yaws ...	148

LEPROSY.

DENECKE	Statistics of a West African Leprosarium	149
ROSSAS	Leprosy in Maranhão	150
DUBOIS & GAVRILOV	Inoculation of Hamsters with Human Leprosy	150
MUÑOZ RIVAS	Fleas and the Transmission of Leprosy ...	151
COCHRANE	Prognosis and Treatment of Leprosy with Reference to its Pathology	151
REENSTIERNA	Further Therapeutic Tests with an Anti-Leprosy Serum	152
TRANT	Treatment of Early Leprosy with Diphtheria Antitoxin	154

Continued on p. v.

Vol. 40. No. 2. **CONTENTS**—*Continued from p.* iv. February, 1943

LEPROSY—*cont.* PAGE

PERVES ... ... Ganglion Infiltration in the Treatment of Nerve Leprosy 155

MACKAY ... ... Control of Leprosy and Tuberculosis in Rural Areas of the Tropics 155

HELMINTHIASIS.

WARNER ... ... Anorectal and Colonic Manifestations of *Schistosoma mansoni* Infestation ... 155

MAGATH ... ... Lethal Dose of Chlorine for Cercariae of *S. mansoni* 156

HOWARD ... ... Rare Appearance of *Clonorchis sinensis* in England 157

SKVORTZOV & TALYSIN ... ... On the Cycle in the Development of the Tape-Worm of *Diphyllobothrium minus* 158

ANDREWS & WEBB ... ... The Effect of Hookworm Damage on Levels of Quinine attained in Blood and Urine of Dogs following Single Doses of Quinine Sulphate 158

RAO ... ... Filariasis in Lakhipur and Binakandy Tea-Gardens, Lower Assam 160

GÖNNERT ... ... The Duration of Life of Human Microfilariae. (Fig.) 160

VAN DEN BERGHE ... ... Researches on Onchocerciasis in the Belgian Congo 162

RODHAIN... ... ... A Case of Onchocerciasis with Generalized Lymphadenitis in a European 167

DEFICIENCY DISEASES.

ALESSANDRI : PALAZUELOS & LERNER Adult Pellagrins in Santiago de Chile ... 168

KRUSE ... ... The Lingual Manifestations of Aniacinosis, and the Detection of Early Changes by Biomicroscopy 169

HELLWIG & FORMAN ... ... Pellagra and Internal Secretions 169

SPRUE.

HÁNES ... ... Diagnostic Criteria and Resistance to Therapy in the Sprue Syndrome ... 170

HAEMATOLOGY.

BHAVE & BOPAIYA ... ... Diet Surveys and Investigations of Haemoglobin Levels in Coorg 170

DE MENDONÇA ... ... Sickle-Cell Anaemia; its Frequency in Brazil 171

VENOMS AND ANTIVENENES.

CHOWHAN ... ... The Rôle of Venom Therapy in Chronic Painful Conditions 172

DERMATOLOGY AND FUNGOUS DISEASES.

RAY & ROCKWOOD ... ... Case of Sporotrichosis Resistant to Treatment 173

COUTINHO & RUSSO ... ... Case of Sporotrichosis due to *Sporotrichum schencki* 174

PARDO-CASTELLO, LEON & TRESPALACIOS ... ... Chromoblastomycosis in Cuba 174

JAMIESON & McCREA ... ... Ringworm of the Feet: Shoes and Slippers as a Source of Re-infection ... 175

DEY & MAPLESTONE ... ... Tinea Imbricata in India 175

ARNOLD ... ... Dermatitis due to the Blossom of *Grevillea banksii* in Hawaii 175

ALEMANY VALL & CASTELLS ESCUDER Necrotic Dermatitis due to the Black Poplar Sawdust induced by the Sun's Rays 176

Continued on p. vi.

Vol. 40. No. 2. **CONTENTS**—*Continued from p. v.* February, 1943

DERMATOLOGY AND FUNGOUS DISEASES—*cont.*

		PAGE
SIMSON & BARNETSON	Report of a Case of Histoplasmosis ...	176
KEY & LARGE	Histoplasmosis of the Knee	177
BOASE	Case of Rhinosporidiosis in a Native of Uganda	177

MISCELLANEOUS.

PLATEL & VANDERGOTEN ; TROLLI ...	Results obtained in Child Welfare Work at Mayombe, Belgian Congo	177–178
DENECKE	Internal Diseases seen in a West African Hospital	179
KERMACK	Some Recent Advances in Chemotherapy	179
JAGUJINSKAIA	Presence of a Peritrophic Membrane in the Stomach of Female *A. maculipennis* ...	179
SOUTH AFRICAN INSTITUTE FOR MEDICAL RESEARCH ; SERGENT ...	Mosquito Repellents	179–180
LUCAS	Poisoning by *Megalopyge opercularis* ...	181
GLAUBACH & GULLER	Pneumonia apparently due to *Trichomonas buccalis*	181
AHMAD	X-Ray Examinations of Bones in the Determination of the Age in Bengali Girls in Medico-Legal Cases	181

BOOK REVIEW.

BARRETO	Report of the Department of Health, Brazil, for 1941	182

(*The Alphabetical List of Authors or Sources is on p. 3 of cover*)

211 pages. Price 7*s.* 6*d.* net.

SUPPLEMENT
to the
Tropical Diseases Bulletin
for **December, 1940**

Summarizing the
MEDICAL AND SANITARY REPORTS from BRITISH COLONIES, PROTECTORATES and DEPENDENCIES, FOR THE YEAR 1938.

Orders should be sent to the

BUREAU OF HYGIENE and TROPICAL DISEASES
Keppel Street, Gower Street, London, W.C.1.

IODISED
'Moogrol'
TRADE MARK

A Mixture of Esters of Acids of the Chaulmoogric Series with 0·5 per cent of Iodine

For the treatment of all forms of leprosy by combined intramuscular and intradermal injection. The addition of iodine to the esters minimises local irritation and permits systematic infiltration of lepromata

BURROUGHS WELLCOME & CO.
(The Wellcome Foundation Ltd.)
LONDON

HOWARDS'

IODIDES

Potass. Soda, Iodoform, Iodum Resub., etc.

□ □ □

QUININES

□ □ □

SOBITA

(Howards' Bismuth et Sodii Tart, P.B.)

Famous for over 100 years.

Manufactured by

HOWARDS & SONS, LTD.,

(Est. 1797)

ILFORD, LONDON

Arsenic in Amoebiasis

TRADE MARK

'STOVARSOL'

BRAND OF ACETARSOL

'STOVARSOL' brand acetarsol, a pentavalent arsenical, presents in tablet form for oral administration a most convenient and effective method of treating amoebiasis. Emetine and its compounds are effective in acute cases but often fail to cure in the later stages. 'Stovarsol' gives better results in the later stages and in chronic or relapse cases.

A general practice is to give emetine for control of acute symptoms and 'Stovarsol' to eradicate amoebae and cysts.

'STOVARSOL' is available in :—

Containers of 100 x gr.	⅙	tablets	. 2s. 0d.
,, ,, 100 x gr.	½	,,	. 3s. 6d.
,, ,, 30 x gr.	4	,,	. 5s. 0d.
,, ,, 100 x gr.	4	,,	. 15s. 9d.

less professional discount and plus purchase tax.

Our Medical Information Department will be glad to supply you with further details.

PHARMACEUTICAL SPECIALITIES (MAY & BAKER) LTD., DAGENHAM, ENG.

5024

BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES BULLETIN.

Vol. 40.] 1943. [No. 2.

SUMMARY OF RECENT ABSTRACTS.*

II. YELLOW FEVER.

Epidemiology.

In the Rockefeller Foundation Review for 1940 (p. 64) it is pointed out that in susceptible wild animals inoculated with yellow fever virus in South America, illness is not as a rule produced, but the virus is present in the circulating blood for some days, during which time the animals are in active movement. This circumstance is favourable to the spread of the virus. The susceptible animals include primates, marsupials, edentates and rodents. The author of the review considers yellow fever to be primarily a disease of jungle animals, with the man-Aëdes-man cycle as a secondary phenomenon. Transmission from animal to animal appears to be effected by jungle mosquitoes. There is, however, no animal reservoir in the accepted sense; the virus is only present in the blood for a few days, after which it disappears and does not return. Mosquitoes tend to harbour the virus for the rest of their lives, which may last for several months.

FINDLAY (p. 65) shows, in two maps, that positive results to tests for immune bodies have been found in areas of Africa considerably wider than those in which definite cases of yellow fever have been recognized. At the same time yellow fever is found in isolated cases without apparent relationship to epidemics. Epidemics occur in towns and in rural areas, and the disease is also endemic in country districts. The largest rural epidemic known was that which recently took place in the Sudan, but others have been reported from West Africa. In these, although it is impossible to exclude *Aëdes aegypti* as a vector, it is possible that other species play an accessory rôle.

Endemic yellow fever may be maintained by the mosquito-man cycle, and although it is known that the blood of many wild and domestic animals contains protective bodies, which presumably indicate past infection, in Findlay's view the important factors in spread are the infected man and the infected mosquito rather than infected animals. [This is an opinion which does not accord with that expressed above in the Rockefeller Report; it may be that the situation in Africa is

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1942, Vol. 39. References to the abstracts are given under the names of the authors quoted, and the pages on which the abstracts are printed.

unlike that in S. America. To the reviewer it seems that there is probably much truth in both contentions; endemic yellow fever has undoubtedly occurred in Africa without recognition at the time, and mild cases are not uncommon. Such endemic disease could flare up to epidemic proportions if there were, for any reason, a large-scale infection of vector mosquitoes. On the other hand, even in the absence of proof of wide infection of animals in Africa, it is not probable that the findings in the animals of S. America, referred to above, hold good for that continent alone. More work on the forest animals and mosquitoes of Africa is evidently necessary for a solution of this problem.]

FINDLAY *et al.* (p. 455) have mapped out the incidence of immune bodies in the Sudan; the northern border of the endemic area runs from the Sahara to the Abyssinian border, probably to the edge of the Abyssinian plateau. To the south it merges into the endemic areas of Uganda, the Belgian Congo and French West Africa. Positive results have been obtained with the sera of domestic animals and certain primates, but the true significance of the former is not clear, since such reactions have also been obtained in non-endemic areas.

KIRK (p. 69) notes that in the Nuba mountains of the Sudan, where the great epidemic occurred, monkeys and hedgehogs, both susceptible animals, were found. There was, however, no evidence of an epizootic in the animals [but if the conditions of S. America are true of Africa, it is possible that the virus circulates while the animals remain clinically little affected]. The evidence of protection tests in recent years indicates that the virus was present in the area long before the outbreak, and the actual cause of the rapid expansion is not clear.

Kirk reports some 15,000 cases and 1,600 deaths. In many cases the diagnosis was confirmed either by protection tests or at post mortem, but it is noted that there were many mild cases which might, in other circumstances, have been regarded as influenza, sandfly fever or the like. The more severe cases conformed to the classical type.

In the Report of the Eastern Bureau of the League of Nations for 1940 (p. 72) it is noted that the area of the Sudan epidemic lies away from the main communications [a point also brought out by Kirk]; it is thought, therefore, that the outbreak was not due to imported infection, especially in view of the fact that yellow fever has been present for some years.

HUGHES *et al.* (p. 455) have tested about 4,000 sera for protective antibodies in Uganda. No positive results were obtained in children in the eastern, central or south-western regions, but in the west immunization rates of 1·7 to 22·6 per cent. were found, the highest being in the area bordering the Ituri forest. This suggests continuing infection, but in spite of intensive investigation for three years no clinical case had at that time been discovered. Later, however, MAHAFFY *et al.* (p. 759) found two cases, in the Bwamba area of western Uganda, in which a diagnosis of yellow fever seemed to be justified; virus was isolated from one. In addition two strains of virus were isolated from wild-caught *Aëdes simpsoni*, the most prevalent mosquito. Protection tests indicate an important focus along the Semliki river, west of the Ruwenzori mountains, especially close to the uninhabited forest.

BABLET (p. 760) inclines to the opinion that the jungle form of yellow fever exists in French Equatorial Africa, but does not give details of any animal reservoir. Scattered cases have been found in man from

the Gabon coast, Brazzaville, the Oubangui-Chari region and near Lake Chad, and from the evidence of protection tests and viscerotomy specimens, these areas are thought to be fairly extensively affected.

Aetiology.

The two strains of virus isolated by MAHAFFY *et al.* (p. 456) from mild cases of yellow fever in the Sudan were both found to be identical with strains isolated in other parts of the world.

FINDLAY (p. 761) has shown that a large proportion of mice develop encephalitis after being starved for 24 hours, then given insulin in a dose of 0·8 units per kgm. body weight, and then an intraperitoneal injection of neurotropic virus. A similar result takes place if the mice are treated with coal gas in place of insulin. The effect of insulin shock, and of coal gas, is to induce oxygen deficiency, and it is probable that this damages the blood-brain barrier and allows the virus to pass into the central nervous system.

Transmission.

KIRK (p. 69) notes that in the Sudan epidemic *Aëdes aegypti* was present throughout the affected area. Though essentially a domestic species, it was found breeding, in the Nuba mountains, 2–3 miles from the nearest house. *Aëdes vittatus*, another known potential vector, was also found. LEWIS *et al.* (p. 685) have proved that *Aëdes taylori*, *Aëdes metallicus* and the pale form of *Aëdes aegypti* are all capable of transmitting yellow fever by bite. The first two species are abundant in the Nuba mountains of the Sudan, where the epidemic of 1940 occurred.

As mentioned above, MAHAFFY *et al.* (p. 759) have isolated the virus from wild-caught *Aëdes simpsoni* in western Uganda.

In the Review of the Rockefeller Foundation for 1941 (p. 615) it is pointed out that species of Haemagogus, known to be capable transmitters of yellow fever in the jungles of S. America, are tree-top dwellers. Virus has been found in tree-top mosquitoes.

ROZEBOOM (p. 74) has shown experimentally that in climates too cold in winter for *Aëdes aegypti* to breed throughout the year, eggs may survive the cold weather, even though the temperature may be below freezing point for several days together, if maintained on sand and protected from snow and rain. Hatching took place when the eggs were immersed in water in the spring.

TEESDALE (p. 833) reports that *Aëdes simpsoni*, *Aëdes aegypti*, *Aëdes metallicus* and *Aëdes pembaensis* have been found breeding in collections of water in pineapple and banana plants in Mombasa. Banana trees may hold water throughout the year.

Pathological and Clinical Findings.

VILLELA (p. 74) describes in detail the histopathology of the liver in fatal cases of yellow fever. He gives an account of mid-zone necrosis and of the Councilman bodies. [In comment, FINDLAY points out that intranuclear inclusions may be present in 20–70 per cent. of liver specimens in yellow fever; the incidence apparently varies in different outbreaks.] Villela describes certain bright ochre-coloured granules scattered among the Councilman bodies, and claims that the presence of these ochre bodies can be used as a basis for the diagnosis of yellow

fever provided that certain other suggestive changes are found :—fatty degeneration in the mid-zone, with jumbling of the trabeculae, increase in size of the nuclei of parenchymatous cells, hyperplasia of Kupffer cells, and the presence of leucocytes in the mid-zone. For fuller information the original abstract should be consulted.

SMITH (p. 686) reports on the histological examination of the liver in 14 cases of jaundice in West Africa which, clinically, had suggested yellow fever. The histological appearances excluded yellow fever, but the aetiology of the condition was not known [see also GAST GALVIS below].

FINDLAY *et al.* (p. 457) report that during the Sudan epidemic there were subsidiary outbreaks of relapsing fever and infective hepatitis, and show, by a detailed statement of the common symptoms of these diseases, how easily they may be confused with yellow fever. They point out the importance of laboratories equipped for virus isolation, viscerotomy services and mouse protection tests, in countries where yellow fever may exist.

DUFF (p. 76) emphasizes the importance of albuminuria, markedly increasing from the second or third day, in the diagnosis of yellow fever. He points out that jaundice and haemorrhages are later signs, and that in mild cases jaundice may be hard to detect.

KIRK *et al.* (p. 457) report five cases in Europeans in the Nuba mountains of the Sudan during the epidemic. All were relatively mild.

Control : *Immunization.*

FINDLAY (p. 65) draws attention to the importance of accurate and early diagnosis in the control of yellow fever ; this depends on liver examination, protection tests or the isolation of virus from the blood. He gives an account of the principles of control of the disease and urges co-ordination between the countries concerned. In the Report for 1940 of the Eastern Bureau of the League of Nations (p. 72) the steps taken by the Sudan Government to control the recent epidemic are outlined.

GAST GALVIS (p. 73) reports on the first 5,000 specimens of liver collected at 117 viscerotomy posts in Colombia from 1934 to 1940. In 196 cases the diagnosis of yellow fever was made, and by means of this service it has been possible not only to prove the presence of the disease in areas in which it was not previously suspected, but also to show that it is absent in other places apparently favourable to its propagation. The service is useful in detecting fatal cases of malaria, and has also shown that certain cases of massive necrosis of the liver, which occurred in two districts and were formerly confused with yellow fever, were not due to that disease ; the aetiology is still unknown [In view of the value of this service in diagnosis and in control of yellow fever it would seem important to institute it on a large scale in Africa.]

HARGETT (p. 458) describes the procedure for the disinsectization of aircraft with an extract of Pyrethrum in deobase oil.

LE VAN (p. 76) shows that Gambusia are useful in eliminating larvae of *Aëdes aegypti* from wells and cisterns.

In the Rockefeller Report (p. 64) it is pointed out that for jungle yellow fever the most important control measure is vaccination, but for urban areas the control of *Aëdes aegypti* is as important as ever. If this mosquito was eliminated from towns the risk of transmission, by fast travelling vehicles, to India and the East could be avoided.

SAWYER (p. 683) in a summary of the epidemiological features of yellow fever, notes that jungle yellow fever exists in South America both as an endemic disease and as migrating epidemics. Prevention includes control of *Aëdes aegypti* in cities and towns, but the only practicable measure against the jungle form is vaccination.

SELLARDS (p. 78) considers that effective immunization requires the injection of living modified virus and the development of infection. In view of the severe reactions which sometimes follow the use of living neurotropic virus from mice, he has tested the French neurotropic strain by injecting very dilute suspensions into the cisterna magna of monkeys. With these great dilutions no clinical symptoms were produced, but immunization was effected in most of the animals. After intracerebral injection, on the other hand, death usually occurred from encephalitis.

SMITH *et al.* (p. 77) failed to find significant difference in the immunizing efficiency of three batches of vaccine prepared from the strain 17D after 212, 342 and 450 subcultures respectively in tissue culture. There were, however, considerable variations in the antibody responses of different individuals to the same doses.

PELTIER *et al.* (p. 761) report on the use of mixed vaccines against yellow fever and smallpox, applied by the scarification method. The yellow fever vaccine consisted of a neurotropic strain. Almost 100,000 natives of Senegal have been immunized by this method, and serum protection tests against yellow fever were found to be positive, after vaccination, in 95 per cent. of those vaccinated, the immunity lasting for at least one year. [The same authors (this *Bulletin*, 1940, Vol. 37, p. 92) have previously shown that this method produced a high proportion of positive results in blood previously negative.] The smallpox vaccine produced results similar to those seen when it is used alone. The authors are so convinced of the value of this method that they propose to extend its use to other French colonies.

BERGE and HARGETT (p. 686) have shown that yellow fever vaccine, prepared from strain 17D inoculated into fowl embryos and diluted either with normal human serum or with water, is capable of producing anaphylaxis in guineapigs. The percentage of animals showing anaphylaxis increases with the age of the embryo used as antigen. SULZBERGER and ASHER (p. 762) report three cases of urticarial reaction after yellow fever immunization ; the vaccines concerned were from three separate batches. *Charles Wilcocks.*

MALARIA.

BARLOVATZ (A.). Nouvel indice d'impaludation en milieu endémique. [**New Index of Malaria Transmission in an Endemic Locality.**]—*Ann. Soc. Belge de Méd. Trop.* 1940. Dec. 31. Vol. 20. No. 4. pp. 407–417. With 3 charts.

The best index of the intensity of malaria transmission is afforded by a study of the infection rates of infants, based on the examination of the blood by the thick drop method, and by spleen palpation. All infants whose spleens extend one finger's breadth or more below the costal arch are considered infected ; all others have their blood examined. The results are recorded according to age groups : fortnightly

age groups are convenient ; the first week of life is ignored. In the example given, the age groups were 8 to 21 days, 22 to 35, 36 to 49 and so on up to 244 days. The percentage infected in each age group is charted in columnar form on transparent millimetric paper, the base of the column having as many millimetres as there are days in the group, and in the height each millimetre represents 1 per cent. When complete, this graph is superimposed on a graph on which have been drawn frequency curves, ranging from five infants per 100 per day infected, to one infant per 500 days. The two curves most closely approximating the summits of the columns are selected. In the illustration given these curves represented 1 per cent. and 0·67 per cent. respectively. The additions or subtractions necessary to make the columns coincide with the curves are written down and added. In the example given, for the 1 per cent. curve the additions totalled 103 and the subtractions 137. For the 0·67 per cent. curve, additions totalled 207 and subtractions 60. The differences were −34 and +147 ; total points 181. The difference between the two curves chosen was 1−0·67=0·33. Deduction to be made from the higher curve was $\frac{0{\cdot}33 \times 34}{181}$ 0·06.

$$1-0{\cdot}06=0{\cdot}94 \text{ per cent.}$$

The index of infant infection was 0·94 per cent. per day. In comparing it with indices of other groups the calculation of the probable errors would be necessary.

In a discussion of this paper it was pointed out that no count had been or could be made of the possibly numerous infants who had died of malaria infection, and that the difficulty of obtaining the exact age in days of infants in native communities would be almost insurmountable. *Norman White.*

SCHWETZ (J.). Note sur le paludisme à Irumu (Ituri, Congo belge). [**Note on Malaria in Irumu (Ituri, Belgian Congo).**]—*Ann. Soc. Belge de Méd. Trop.* 1941. Sept. 30. Vol. 21. No. 3. pp. 221–224.

Irumu is the capital of the Ituri district, situated on a plateau 925 metres high, close to the confluence of the Shari and Ituri rivers, 1·5°N., near the eastern frontier of the Belgian Congo. In 1933 the author examined 67 pupils at the rural school of Irumu ; in 1939 he had an opportunity of examining 59 pupils at the same school. The results of these two examinations are compared. Both gave evidence of endemic malaria of average intensity : The proportion of children infected, of *P. malariae* infections, and of gametocyte carriers all decreased with increasing age. The 1939 examination, however, showed signs of improvement. The parasite rate of all ages, 5 to 18, had fallen from 85 per cent. in 1933 to 52·5 in 1939 (thick drop examination results).

No antimalaria work has been done at Irumu, and there are no true seasonal changes to account for the reduction. The author concludes that the results of the examination of such small groups as these, while giving a good general idea of the situation, are bound to exhibit fluctuations which may not be significant.

P. falciparum is responsible for the majority of infections. It was combined with *P. malariae* in some 20 per cent. of the positive films. *P. vivax* was seen twice in 1933, not at all in 1939. Both *A. gambiae* and *A. funestus* were found in adult and larval form. Adults were rarely found in European houses but considerable numbers were found in native dwellings. *Norman White.*

SCHWETZ (J.) & BAUMANN (H.). Note sur le paludisme trouvé dans un village des environs de Coquilhatville et à Bikoro (Lac Tumba). [**Note on Malaria in a Village near Coquilhatville and in Bikoro on Lake Tumba.**]—*Ann. Soc. Belge de Méd. Trop.* 1941. Sept. 30. Vol. 21. No. 3. pp. 225–230.

This paper gives the results of the examination of the blood of 115 inhabitants of the village of Boyera on the Congo about five kilometres from Coquilhatville, and of 52 students, aged 12 to 18, in the Catholic School of Bikoro on Lake Tumba. The only information hitherto published concerning malaria in the Coquilhatville area was contained in a paper published by the same authors [see this *Bulletin*, 1939, Vol. 36, p. 777]. They had found that malaria was only feebly endemic in Coquilhatville. This applies also to the village of Boyera, though admittedly the number of observations, especially of young children, was too few to permit of generalizations. None of six infants under two years of age was infected. Parasites were found in 5 of 12 children and adolescents aged 4 to 17, and in 16 of 97 adults. *P. malariae* was only found in two films. All this is indicative of feeble endemicity. In three films from adults trypanosomes of sleeping sickness were found.

In the Bikoro school, examination by the thick drop method showed parasites in 9 of 17 boys aged 12 to 15, and in 22 of 35 aged 16 to 18. These figures indicate relatively high parasite rates but the parasites were for the most part so few in number that the examination of thin films revealed their presence in only five of the 31 positive cases. Only *P. falciparum* was found. *Microfilaria perstans* was found in 30 of the students. *Norman White.*

BOURGUIGNON (G. C.). Notes sur le paludisme à Elisabethville. [**Notes on Malaria in Elisabethville.**]—*Ann. Soc. Belge de Méd. Trop.* 1940. Dec. 31. Vol. 20. No. 4. pp. 419–459. With 1 chart.

During the eight years 1932 to 1939 the Laboratory of Elisabethville has examined more than 31,000 specimens of blood for malaria parasites, submitted for examination for clinical reasons. The positive findings are tabulated by months for the whole period, and separately for European and native residents. One can admit that such figures are a valid index of the seasonal prevalence of clinical malaria among the European residents, who are under close medical supervision and who do not possess that state of premunition characteristic of the native races throughout the Congo. The significance of the presence or absence of malaria parasites in the blood of native patients whose symptoms suggest the possibility of malaria as a cause, is difficult to evaluate in severely endemic and hyperendemic regions. On the high Katanga plateau on which Elisabethville is situated there is a well marked seasonal prevalence of malaria. The rainy season, with abundant almost continuous rainfall, lasts from early November to the end of March or mid-April; there is generally a slight remission at the end of January. In the cool dry season the temperature may fall to near freezing point.

There has been a fairly constant trend in the monthly incidence of positive malaria laboratory findings. For Europeans these reach their height in April and May; in March and April there is as marked an

increase in the number of native blood preparations sent for examination. In July, August and September, the cool season, there is almost no clinical malaria among the Europeans; the number of suspected clinical malaria cases among the natives is also at its lowest during these three months. The author believes that an explanation of the seasonal exacerbation of malaria is a question of the densities of *Anopheles gambiae* and *A. funestus*.

Small scale investigations were made of the parasite rates of apparently healthy natives in villages in this south-east extremity of the Congo; a mean rate of 68·6 per cent. was found.

The author has noted a striking variation in the morphology of the schizonts of *P. falciparum*. In acute attacks these are relatively large and numerous; in latent malaria and especially in the cool season, schizonts are minute and very few in number. Nearly all the malaria in Elisabethville is due to *P. falciparum*. *P. ovale* has been found once, *P. vivax* not at all, and *P. malariae* is by no means common; when found it is usually in a native child less than 8 years old. Gametocytes are much rarer in Elisabethville than in the Congo basin; they are hardly ever found in Europeans. In February and March a few may be found, chiefly in native infants from 0 to 3 years of age.

[The paper is very long and somewhat discursive; a complete summary is hardly possible.] *Norman White.*

i. NICOLAY (F.). Le paludisme à Boma en 1938 et en 1939. [**Malaria in Boma in 1938 and in 1939.**]—*Ann. Soc. Belge de Méd. Trop.* 1940. Dec. 31. Vol. 20. No. 4. pp. 479–488.

ii. SCHWETZ (J.). Sur le paludisme à Boma (à propos de l'étude de Nicolay). [**Malaria in Boma, with Special Reference to Nicolay's Observations.**]—*Ibid.* pp. 507–513.

i. Nicolay publishes in great detail the results of the blood examination of a large number of the inhabitants of Boma and arranges them by age groups, and according to the season in which the examinations were made. It is not possible to summarize his findings. He has noted a rise in the parasite rate at the end of the rainy season in April and May, a rise most marked among children aged 5 to 10. There are not more anophelines at this season but he found salivary gland infection rates of *A. gambiae* and *A. funestus* of 14 and 12 per cent. respectively as compared with average annual rates of 8·9 and 5·9. *A. pharoensis* has too low infection rates and *A. nili* is too scarce for either to play any important part. He thinks that the human factor is important. The human body displays a certain fatigue at the end of the rains; spleen rates are higher than at other times, and anaemia is more pronounced and more widespread.

ii. Schwetz, in commenting on Nicolay's findings, does not consider the observations sufficient in number or consistent enough to support the deductions that have been drawn. Boma is low-lying on the Congo, only 90 kilometres from its mouth, and in tropical conditions such as these, even if mosquitoes be somewhat less numerous during the dry than during the rainy season, there are always enough and to spare. He compares Nicolay's findings with his own of 1936 and concludes that malaria conditions in Boma have undergone very little change [see this *Bulletin*, 1938, Vol. 35, p. 804]. *Norman White.*

COLLIGNON (E.). La campagne antipaludique de 1939 dans le département d'Alger. [**The Anti-malarial Campaign of 1939 in Algiers.**]—*Arch. Inst. Pasteur Algérie.* 1940. Vol. 18. No. 2. pp. 221–236. With 4 plates & 2 graphs. [Summary taken from *Rev. Applied Entom.* Ser. B. 1942. Oct. Vol. 30. Pt. 10. p. 148.]

An account is given of the measures carried out in the campaign against Anophelines and malaria in the Department of Algiers in 1939, when there was an epidemic, caused principally by *Plasmodium falciparum.* This resulted from an exceptional abundance of Anophelines following abnormally heavy rainfall and a persistent reservoir of infection, and to a certain extent from an increase in susceptibility on account of the relatively low incidence of malaria in previous years. The results of the campaign were excellent, but the outbreak nevertheless showed that control operations must be extended and intensified.

SIEGFRIED (G.) & IZAC (R.). Le paludisme dans l'Annexe de Laghouat. [**Malaria in Laghuat, Algeria.**]—*Arch. Inst. Pasteur Algérie.* 1940. Vol. 18. No. 3. pp. 279–294. With 2 plates & 1 map. [Summary taken from *Rev. Applied Entom.* Ser. B. 1942. Oct. Vol. 30. Pt. 10. pp. 148–149.]

An account is given of the topography and climate of the Dependency of Laghuat, which lies between 0° 1′ W. and 2° E. longitude and 33 and 35° N. latitude. The population of Laghuat town and of the northern part of the Dependency is mainly settled, while that of the southern part is nomadic. The two groups come into close contact during the winter, when the nomads visit the town and villages. Malaria does not exist under normal conditions in the town of Laghuat, where Anophelines rarely occur as there is no water that could provide permanent breeding places. In the villages, the conditions with regard to potential breeding places in each of which are described, there is enough endemic malaria to give rise to short and severe epidemics when particularly favourable conditions arise. An epidemic occurred in 1939 in a very small village on the outskirts of which larvae of *Anopheles hispaniola,* Theo., were found in a spring among fairly dense vegetation.

RUSSELL (Paul F.) & JACOB (V. P.). **On the Epidemiology of Malaria in the Nilgiris District, Madras Presidency.**—*Jl. Malaria Inst. of India.* 1942. June. Vol. 4. No. 3. pp. 349–392. With 1 map, 3 charts, 3 figs. & 2 plates. [26 refs.]

Data collected from January 1940 to January 1941 form the basis of this fully documented report, to which a summary cannot do full justice. The Nilgiris area, about 11·5° N., in the south-west of India, consists of a high central plateau, 35 miles long, 29 miles wide, containing the towns of Ootacamund (7,500 feet) and Coonoor (6,000 feet), descending steeply to the west to the Nilgiris portion of the Wynaad, a tableland 3,000 feet high, and a steep jungly valley to the east, descending through Kallar to the Mettupalaiyam plains, which have an altitude averaging 1,000 feet. Kallar is just over the border of the adjacent Coimbatore District, but has been included in the survey.

Steep uninhabited cliffs bound the Nilgiris on the north and south. The area is thus naturally subdivided into eastern, central and western sections each of which has well-marked characteristics differentiating it from the other two. Nilgiris east has a rainfall averaging 55 inches fairly well distributed though usually greatest in October–November (N.E. monsoon). The streams at Kallar (1,500 feet) did not have the heavy spates in October–November 1940 that sometimes occur: Nilgiris central has an average rainfall of 65 inches (Coonoor), fairly well distributed but heaviest in October–November. Nilgiris west has an average rainfall of over 150 inches, more than half that amount falling in June, July and August (S.W. monsoon); 60 of the 186 inches of rain that fell in 1940, fell in June. All streams, ditches and irrigation channels were thoroughly flushed out.

The anopheline fauna of the Nilgiris is very rich. Notes are given of the breeding places of 23 species found: *A. aconitus*, *A. aitkeni*, *A. annandalei* var. *interruptus*, *A. annularis*, *A. barbirostris*, *A. culicifacies*, *A. fluviatilis*, *A. gigas*, *A. gigas* var. *simlensis*, *A. hyrcanus* var. *nigerrimus*, *A. jamesi*, *A. jeyporiensis*, *A. karwari*, *A. leucosphyrus*, *A. lindesayi* var. *nilgiricus*, *A. maculatus*, *A. majidi*, *A. pallidus*, *A. splendidus*, *A. subpictus*, *A. tessellatus*, *A. vagus*, and *A. varuna*.

The only vector of importance is *A. fluviatilis*; it was found breeding in ricefields, field and irrigation channels, hill-streams, river edges spring pools and wells. The largest numbers were found in hill-streams and field channels, generally with moderate or no shade, but sometimes with fairly dense natural cover. Photographs illustrate types of breeding place of this species. In Nilgiris east *A. fluviatilis* was found breeding throughout the year; in Nilgiris west the very heavy rainfall caused this running-water breeding species almost to disappear from July to September. *A. fluviatilis* was found only below 4,000 feet. In some seasons, however, with unusually high average temperatures, it may appear at levels as high as 5,500 feet. Adult *A. fluviatilis* were abundant in Nilgiris east throughout the year, with maximum density from April to July, inclusive. In Nilgiris west it was never so abundant; most were caught in May, June and August. Everywhere it was most commonly captured in human dwellings. Of 2,580 *A. fluviatilis* dissected, 17·3 per cent. were found infected, the oöcyst and sporozoite indices being 9·7 and 10·1 per cent. respectively. Of 1,515 anophelines of other species dissected, none was infected. With two exceptions all the infected specimens in Nilgiris west were taken in May and June. In Nilgiris east (Kallar) infected specimens were found in every week from March 4th to January 20th. In this hyperendemic spot weekly sporozoite indices ranged from 1·5 to 34·8. Very high infection rates of this species were reported by COVELL and HARBHAGWAN in the Wynaad [see this *Bulletin*, 1940, Vol. 37, p. 740]: there can be few if any more effective vectors of malaria than *A. fluviatilis*. Spleen rates varied from 100 per cent. in Kallar (Nilgiris east) and 51·9 per cent. in Gudalur (Nilgiris west) to 0·9 in Coonoor (Nilgiris central). Spleen rates varied with altitude: 1,000 to 1,200 feet, 4·4; 1,200 to 2,000 feet, 78·1; 2,000 to 4,000 feet, 50·4; above 4,000 feet, 6 per cent. Parasite rates were 53·3 per cent. in Kallar; 30·7 in Gudalur; and 0·3 per cent. in Coonoor. *P. malariae* is the most common species in Nilgiris East; less common in Nilgiris west. Infant malaria indices in the Devala-Gudalur area of Nilgiris west ranged from 40 to 59·8 per cent. *P. malariae* produced the greatest percentage of large spleens. Half the children with *P. vivax* infections had no spleen enlargement

when seen. There is practically no malaria in the Nilgiris above 4,000 feet. In exceptional years and exceptional places malaria might be acquired up to 5,500 feet. *Norman White.*

MUMFORD (Edward Philpot). **Mosquitoes, Malaria and the War in the Pacific.**—*Science.* 1942. Aug. 28. Vol. 96. No. 2487. pp. 191–194. With 1 fig. (map).

The author gives a general account of the distribution and importance of malaria in the Pacific Islands. He touches on the importance of the Dutch East Indies as the principal source of quinine, and on the danger of the introduction of malaria into Fiji or Polynesia, from which Anopheles and malaria are at present absent. This danger, to which attention has been called frequently by British and French writers, is obviously much increased by the movements of naval ships and of aircraft.

It is perhaps unnecessary that the author again raises the question of the presence of Anopheles in New Caledonia. We had supposed that some years ago it was settled and accepted that the records were traceable to an error.

The paper does not include information as to the abundance or clinical severity of malaria in the area in which it occurs.

P. A. Buxton.

SÚTTER (V. A.) & ZÚNIGA (H.). **A Malaria Survey of El Salvador, Central America.**—*Amer. Jl. Trop. Med.* 1942. July. Vol. 22. No. 4. pp. 387–398. With 4 figs. [11 refs.]

El Salvador is the smallest of the republics on the isthmus joining North and South America. It lies wholly on the Pacific seaboard, facing south, about latitude 14°N., and is bounded on the land side by Guatemala and Honduras. Its area is only about 34,000 square kilometres. It is divided into 14 departments containing 259 municipalities. The authors of this malaria survey were handicapped by the lack of a complete topographical map of the country; the altitude of the localities surveyed was determined by them with an aneroid barometer. The low coastal zone is 19 to 25 kilometres wide, through which six main rivers flow to the sea. Two mountain ridges traverse the country from west to east; one near the coast contains numerous volcanoes, 1,000 to 2,300 metres high. The northern range contains a peak 2,649 metres high. The country is volcanic. There are only slight variations in the mean temperature. January is the coolest month, April or May the hottest. The rainy season lasts from April to November, the dry season from December to March. There are 359 rivers that flow all the year round, and four lakes with an average area of 30 square kilometres. There are mangrove swamps in the two main coastal lagoons. The estimated population is 1,766,000, 52 inhabitants per square kilometre. Salvadoreans are a racial mixture of Indians and Whites. The general death rate in 1940 had fallen to 17·68 per 1,000, from 27·75 in 1926, and 24·5 in 1934. The malaria death rate in 1940 was 1·88 per 1,000. Hospital admissions for malaria are highest in December and January and lowest from March to May.

All but two of the headquarters of municipalities were visited.

Spleen examinations, nearly all of school-children, numbered 23,614, blood examinations 11,354. The provincial or departmental spleen indices varied from 9 to 35; the mean rate was 22·5 per cent. The blood

films were made from all children with splenomegaly and generally from one out of three with non-palpable spleens. Parasites were found in 708 of the 11,354 bloods examined (thick drop): *P. vivax*, 189; *P. falciparum*, 197; *P. malariae*, 144; mixed and undetermined, 178. Splenic indices decreased with increasing altitude. This was also the case with the percentage of positive blood films but the differences were not statistically significant below 600 metres. *P. vivax* was most frequent in children with small spleens; both *P. falciparum* and *P. malariae* were more commonly associated with the larger spleens.

Anophelines were studied in ten localities; seven species were found. Only *A. albimanus* and *A. pseudopunctipennis* were very prevalent. *A. albimanus* prevalence varies inversely with altitude; *A. pseudopunctipennis* prevalence varies directly with altitude. *A. albimanus* was the only species found infected, there is no evidence that any other species acts as a vector of malaria in El Salvador. *Norman White.*

KUMM (Henry W.) & ZÚNIGA (Hernán). **The Mosquitoes of El Salvador.**—*Amer. Jl. Trop. Med.* 1942. July. Vol. 22. No. 4. pp. 399–415. With 2 figs.

Fifty-eight species of mosquitoes were identified in this mosquito survey of El Salvador. Attention was focussed on the anophelines, of which eight species were found: *A. albimanus*, *A. apimacula*, *A. argyritarsis*, *A. eiseni*, *A. neomaculipalpus*, *A. pseudopunctipennis*, *A. punctimacula*, and *A. hectoris*. The last was only found in larval or pupal form. Of the 16,281 total adult catches 65·4 per cent. were *A. albimanus* and 33·6 per cent. *A. pseudopunctipennis*. The last named is relatively more prevalent than in either Panama or Costa Rica where it formed but 0·1 and 3·1 per cent. respectively of the total anophelines caught. The corresponding percentages of *A. albimanus* in the three countries were Panama 92·7, Costa Rica 89·7, and El Salvador 65·4. The authors think rainfall affords the explanation: the average yearly rainfall of Panama and Costa Rica is about 100 inches; in El Salvador it is less than 75 inches. *A. pseudopunctipennis* in El Salvador is a dry season species; *A. albimanus* is more abundant during the rains. *A. argyritarsis* is not uncommon in larval and pupal form but adults are very rarely found; it is a vector of no importance in this part of Central America. The salt water Anopheles, *A. aquasalis*, Curry, was not found in El Salvador.

Altitude is an important ecological factor determining anopheline distribution in El Salvador. *A. albimanus*, *A. neomaculipalpus* and *A. punctimacula* are chiefly lowland species. *A. hectoris* was found only in the highlands; there was no malaria in the two places in which it was taken. The other four species were found at all elevations, *A. pseudopunctipennis* most frequently at intermediate heights.

With regard to mosquito species other than Anopheles it is of interest that, although four species of Haemagogus and eight of Aëdes were found, neither *A. leucocelaenus* nor *H. capricorni*, the two species that have been found naturally infected with yellow fever in the forests of South America, were ever found in El Salvador. Past epidemics of yellow fever in El Salvador all seem to have been of the urban type. *Norman White.*

OLPP (G.). Unheilvoller Einfluss der Malaria auf die deutsche Geschichte. [**Deleterious Effect of Malaria on German History.**]—*Deut. Trop. Ztschr.* 1942. May 1. Vol. 46. No. 9. pp. 225–232. [19 refs.]

KITCHEN (S. F.) & PUTNAM (Persis). **Observations on the Mechanism of the Parasite Cycle in Falciparum Malaria.**—*Amer. Jl. Trop. Med.* 1942. July. Vol. 22. No. 4. pp. 361–386. With 8 figs. [12 refs.]

The parasite cycle of *Plasmodium falciparum* infections was studied in 55 negro patients, 34 of whom were infected by mosquito bite and 21 by blood inoculation. Daily observations were made and the following key-points noted :—day of first appearance of trophozoites, day of their maximum density and day of their modal density ; day of first appearance of gametocytes, day of their maximum density and day of their modal density, and the first and last days of fever. These points are surprisingly constant. They were unaffected by quinine when it was necessary on clinical grounds to administer the drug. In infections produced by blood inoculation the intervals were little different from those observed in natural infections. All this points to stability in the cycle. In certain patients who are naturally resistant, or have acquired immunity, or have been given quinine treatment, the timing of certain key-points may be altered, but this does not mean that the preceding or following key-points have necessarily been changed also. If the preceding interval or segment is lengthened, then the succeeding one is shortened and *vice versa*, so that the cycle is readjusted. It is suggested that this stability is an indication that the events in the parasite cycle are determined before the appearance of trophozoites in the peripheral blood and possibly at the time of inoculation. The belief is expressed that gametocyte formation begins before the end of the prepatent period and possibly soon after the inoculation of the patient. Consequently the interval of 10 days between the first appearance of trophozoites and gametocytes and between their peak densities indicates that a period for development is required by gametocytes over and above that needed for them to accumulate sufficiently to reach microscopic visibility.

The paper is illustrated by a number of curves, the study of which is necessary for a clear comprehension of the conclusions arrived at.

C. M. Wenyon.

ROUBAUD (E.), CHORINE (V.) & GUIRAUD (P.). Épreuves négatives de transmission par l'anophèle d'une souche ancienne de paludisme d'inoculation (*Plasmodium vivax*). [**Unsuccessful Attempts to transmit an Old Inoculation Strain of** *Plasmodium vivax* **by Anopheles.**]—*Ann. Inst. Pasteur.* 1941. Dec. Vol. 67. No. 6. pp. 462–464.

The strain of *P. vivax* still being used for malaria therapy in the Saint Anne Asylum in Paris has been kept going by mechanical transmission from man to man ever since 1923; it has never been transmitted through Anopheles during this long period. It still produces gametocytes, sometimes in quantity sufficient to infect Anopheles, were the strain so transmissible. Two experiments are described in which two batches, one of 32 the other of 40, female *A. maculipennis atroparvus* were fed on patients in whose blood gametocytes were present. No mosquito became infected ; no sporozoites were ever found and all attempts at infecting susceptible patients with these mosquitoes consistently failed. The authors consider that there are advantages in using for malaria-therapy a strain that has lost the capacity of infecting anophelines. It obviates any danger of

malaria infection in the neighbourhood of patients where mosquito vectors of malaria may exist.

In the discussion MOLLARET stated that the strain of *P. vivax* used in the Salpêtrière was eleven years old. The gametocytes had lost the power of exflagellation. *Norman White.*

MATEVOSIAN (Ch. M.). Découverte du *Plasmodium ovale* Stephens (1922) en Arménie. [*P. ovale* **in Armenia.**]—*Med. Parasit. & Parasitic Dis.* Moscow. 1940. Vol. 9. No. 3. [In Russian pp. 291–294. With 15 figs.]

SAUTET (J.). L'anophélisme en Syrie et au Liban dans ses rapports avec le paludisme. [**Anopheles of Syria and Lebanon: Relationship with Malaria.**]—*Bull. Mus. nat. Marseille.* 1941. Vol. 1. pp. 106–129. With 2 plates. [Summary taken from *Rev. Applied Entom.* Ser. B. 1942. Oct. Vol. 30. Pt. 10. pp. 152–153.]

A complete list of the Anophelines found in Syria and the Lebanon is drawn up from a study made by the author in 1940 and from previous records. *Anopheles sergenti*, Theo., *A. superpictus*, Grassi, *A. pharoensis*, Theo., *A. algeriensis*, Theo., and *A. maculipennis*, Mg., probably var. *sacharovi*, Favr. (*atratus*, Edw.), had already been recorded from the Sanjak of Alexandretta. *A. m. sacharovi*, *A. superpictus* and *A. hyrcanus*, Pall. were found in Syria by the author and previous workers, and in addition, *A. sergenti*, *A. multicolor*, Camb., *A. algeriensis* and *A. claviger*, Mg. (*bifurcatus*, auct.) occurred in the Lebanon. The fauna of the Alaouite territory was the same. *A. claviger* is the only vector of malaria in the southern Lebanon. *A. m. sacharovi* is the most dangerous everywhere else, followed by *A. superpictus* and finally *A. sergenti* and *A. multicolor*.

A. maculipennis var. *sacharovi* here develops exclusively in fresh water and *A. sergenti* and *A. superpictus* chiefly in running, pebbly water. *A. multicolor* occurs in brackish water, *A. hyrcanus* and *A. algeriensis* in marshes, and *A. claviger* in cisterns and open-air rural breeding places. *A. maculipennis* var. *sacharovi* is the most domestic species, followed by *A. sergenti* and *A. superpictus*; *A. multicolor* also enters houses. *A. sergenti* predominates in autumn, *A. algeriensis* in winter, *A. hyrcanus* in spring, and *A. superpictus* and *A. m. sacharovi* in summer and autumn.

It will be remembered that LEESON found *A. marteri* in Syria. See this *Bulletin*, 1942, Vol. 39, p. 516.—*Ed.*]

DE MELLON (Botha). Estudos entomologicos da colónia de Moçambique. **Entomological Studies in the Colony of Mozambique.**—315 pp. With numerous illustrations & 2 folding maps. 1941. Lourenço Marques: Estação Anti-Malárica. [Imprensa Nacional de Moçambique.]

i. Relatorio acêrca dos vectores do paludismo em algumas partes da Africa Oriental Portuguesa, com sugestões para o seu combate. [**An Account of Malaria Vectors in Parts of Portuguese East Africa, with Suggestions regarding Control Measures.**] pp. 7–44. With 1 folding map & 12 figs.

ii. Relatorio sôbre os vectores da malaria em Lourenço Marques durante a estação fria. [**Malaria Vectors in Lourenço Marques during the Cool Season.**] pp. 55–60.

i. At the request of the Director of the Health Services of Mozambique the author carried out an investigation of the malaria vectors in that

Colony in the first three months of 1938, a time of the year when both anophelines and malaria are most abundant in adjacent parts of South Africa. Most of the time was spent in Lourenço Marques and neighbourhood: a short visit was made to the town of Mozambique. A good account is given of the bionomics of the two chief malaria vectors of South Africa, *A. gambiae* and *A. funestus*; the influence of climatic conditions on their distribution and prevalence is outlined. This was the subject of a paper published by the author in 1934 [this *Bulletin*, Vol. 31, p. 715]. *A. coustani* var. *tenebrosus*, a zoophilic species that hardly ever enters human habitation, was found in a stable in Lourenço Marques in very large numbers; the anthropophilic species *A. gambiae* and *A. funestus* were hardly ever found in stables though they abounded in nearby human dwellings. Natives who slept in stables thus received some sort of protection from the dangerous species [this *Bulletin*, 1936, Vol. 33, p. 245].

The important breeding places of *A. gambiae* and *A. funestus* in and around Lourenço Marques are described, and suggestions are made as to the measures that might be taken to deal with them. Very good photographs and a map add interest to the description.

ii. A second visit to Lourenço Marques was paid at the end of July. Active breeding of *A. funestus* and *A. gambiae* was still taking place, notably in Lake Paixão, and on the sea-coast at Sommerschield. The little lake is largely man-made, being, in fact, a large borrow pit, but it is fed by a spring. The water was limpid and there was much aquatic vegetation; *A. funestus* was plentiful. It is proposed to deal with the danger by filling. At Sommerschield springs were also found to be responsible for the large amount of water which produced *A. gambiae* and *A. funestus* in large numbers. A costly drainage system will be necessary to remove this serious menace to health. The discussion of ways and means is of local interest only.

Norman White.

DE MEILLON (Botha). Estudos entomológicos da colónia de Moçambique. [**Entomological Studies in the Colony of Mozambique.**]—315 pp. With numerous illustrations & 2 folding maps. 1941. Lourenço Marques: Estação Anti-Malárica. [Imprensa Nacional de Moçambique.] Relatório da Missão Entomológica da colónia de Moçambique (Africa Oriental Portuguesa) 22 de Fevereiro a 13 de Junho de 1940. [**Report of Entomological Mission in the Colony of Mozambique, Portuguese East Africa, from February 22 to June 13, 1940.**] pp. 61–136. With 38 figs. & 1 folding map.

This preliminary report of an extensive inquiry is concerned only with Anopheles. Illustrated with excellent photographs and very well produced it makes interesting reading. It describes the conditions and the anophelines found in 37 localities from south of Lourenço Marques to the neighbourhood of Lake Nyasa; in most cases photographs of typical Anopheles breeding places are reproduced and suggestions are made as to how they might be treated. A summary of such a report is not possible. Attention can be directed, however, to a few facts of interest.

In all 19 species of Anopheles were identified. In nearly all the 37 localities *A. gambiae* or *A. funestus*, or commonly both, were found, sufficient in numbers to account for all the malaria that exists. In only one locality was neither species found. This was in Furancungo,

splendidly situated at a height of 1,260 metres in the Tete Province ; it seems to be free from malaria. Other species of Anopheles were found breeding there in abundance, *A. longipalpis*, *A. rhodesiensis*, *A. demeilloni*, *A. natalensis*, *A. marshalli*, *A. rufipes*, and *A. coustani*. In one other place, Namaacha, situated at a height of 600 metres, about 80 kilometres south of Lourenço Marques, for the population of which it is a health resort, only very few *A. funestus* were found, and no *A. gambiae*. Namaacha might probably be freed from malaria.

The species of Anopheles identified in Mozambique, arranged in the order of the number of localities in which they were found, were : *A. funestus*, *A. gambiae*, *A. coustani*, *A. squamosus*, *A. rufipes*, *A. rivulorum*, *A. marshalli*, *A. rhodesiensis*, *A. maculipalpis*, *A. theileri*, *A. demeilloni*, *A. longipalpis*, *A. leesoni*, *A. pharoensis*, *A. nili*, *A. seydeli*, *A. natalensis*, *A. pretoriensis*, and *A. brunnipes*.

Often no larvae were found in collections of water which at first sight seemed eminently favourable for their propagation. This was specially noticeable along the coast where plantations, lagoons, lakes and rivers are numerous. In some of these there was much aquatic and subaquatic vegetation, and the water was rich in organic material. The equipment of the Mission did not permit of the physical and chemical examination of water. In other collections of water the presence of large numbers of small fish probably accounted for the absence of mosquito larvae. A study of the local fish might give profitable results. Some interesting remarks are made about rice cultivation and the breeding of *A. gambiae* and *A. funestus*. Along the coast the extreme prevalence of one or two species of Taeniorhynchus (Mansonioides) makes life almost unbearable in places.

Norman White.

ROCKEFELLER FOUNDATION. A REVIEW FOR 1941 [FOSDICK (Raymond B.)]. pp. 17–19.—**The Death of the Gambiae.**

In this review of work completed in 1941 is a most interesting reference to *Anopheles gambiae* in Brazil. Readers of this *Bulletin* will recall the immense outbreak of malaria which, in recent years, has resulted from the introduction of that mosquito from West Africa, and the great efforts made to cope with it. Under the leadership of SOPER of the Rockefeller Foundation, over 2,000 trained workers have moved to eradicate *A. gambiae* and it is now reported that during 1941 thorough search failed to reveal the presence of a single specimen of *A. gambiae* throughout the area once affected.

Nevertheless, the danger is not over, since a dead specimen has been found in a fumigated aeroplane which arrived in Brazil, and others may be introduced alive, as they were before, in ships or aeroplanes, unless strict precautions are continuously observed. *A. gambiae* could just as easily be transported to Asia, *Aëdes aegypti* infected with yellow fever could be carried by air to countries hitherto untouched by that disease, and a dead tsetse fly has been found in an aeroplane which arrived in Brazil from Africa. *C. W.*

ROY (D. N.) & BISWAS (T. C.). **On the Importance of *Anopheles pallidus* as a Carrier of Malaria in Udaipur State, Central Provinces.** —*Jl. Malaria Inst. of India.* 1942. June. Vol. 4. No. 3. pp. 417–420.

Udaipur State is a hilly tract in the east of the Central Provinces of India. In Dharamjaigarh, its capital, the spleen index of children

in August–October was found to be 60·8 per cent. The following anophelines were identified: *A. vagus, A. fluviatilis, A. pallidus, A. culicifacies, A. subpictus, A. jeyporiensis, A. ramsayi, A. hyrcanus, A. aconitus,* and *A. barbirostris.* From August to October *A. pallidus* and *A. culicifacies* were by far the most frequent, the former being the more prevalent of the two in August. Of 719 *A. pallidus* caught in houses and dissected, six had sporozoites in the salivary glands; five of 881 *A. culicifacies* caught in houses had sporozoite infections.

Norman White.

AITKEN (T. H. G.). **The *Anopheles* Complex in California (Diptera, Culicidae).**—*Proc. 6th Pacif. Sci. Congr. 1939.* Vol. 4. pp. 463–486. With 4 figs.. [4 pages of refs.]

TOMITA (Masaji). Spektroskopische Untersuchungen des Malariaharns. [**Spectroscopic Examination of the Urine in Malaria.**]—*Hoppe-Seyler's Ztschr. f. Physiol. Chem.* 1941. Sept. 12. Vol. 270. No. 1 & 2. pp. 14–15.

It can hardly be doubted that in malaria the blood pigments are set free, and that they appear in the urine. Pyrrol bodies, after oxidation, show a definite absorption band in the spectrum, and this can be displayed, in malaria, by the following test:—concentrated HNO_3 is added to the urine, when a brick-red colour is developed at the line of contact and the mixture becomes generally red on shaking. An amyl alcohol extract of this pigment shows, spectroscopically, a sharply defined band from *b* to a little over the mid-point between *b* and *F* (λ 517 to λ 500 mμ). This may be apparent by examination of the urine alone; in doubtful or negative cases the amyl alcohol extract may give the typical spectrum. Urorosein and urobilin can easily be eliminated by extraction with ether or chloroform.

The reaction is apparently specific, and is usually positive in acute and chronic cases; it does not appear in normal urine. It is claimed that it can be used as a test of cure.

C. W.

RAO (V. Venkat). **The Effect of stocking Ricefields with Sullage on Anopheline Breeding at Khurda Road.**—*Indian Med. Gaz.* 1942. Apr. Vol. 77. No. 4. pp. 214–219. [11 refs.]

This is a second report on the value of the intermittent application of sullage to rice-fields during the dry season as a deterrent to anopheline breeding. [See this *Bulletin*, 1942, Vol. 39, p. 299.] In this part of India there is no irrigation properly so called, the crop being dependent upon the rainfall. Rice is broadcast in the fields about the middle of June, when the south-west monsoon sets in; it is not transplanted as in many other parts of India. The application of sullage to the fields was carried out once a week from mid-February to mid-May. Not more than an inch of sullage was allowed to flow into the field; this was completely absorbed by the soil in four days and so provided no facilities for Culex breeding, a matter of importance in view of the wide prevalence of filariasis. Ten adjacent fields were selected for experiment, five being treated, the alternate fields serving as controls. The same strain of rice was sown in all. Larval samplings of all fields were made once a week from July to November, inclusive. In the treated fields there was an actual increase in the breeding of non-carrier

species such as *A. subpictus* and *A. vagus*, but a substantial decrease in the breeding of the vector species *A. annularis*, and *A. aconitus*. *A. annularis* is the most important vector: 10 larvae were found in treated fields, 315 in controls. The yield of rice was about 24 per cent. higher in the treated than in the untreated fields. *Norman White.*

RUSSELL (Paul F.), KNIPE (Fred W.) & RAO (H. Ramanatha). **On the Intermittent Irrigation of Ricefields to control Malaria in South India.**—*Jl. Malaria Inst. of India.* 1942. June. Vol. 4. No. 3. pp. 321–340. With 4 figs. on 2 plates & 1 chart. [14 refs.]

This paper describes experiments to determine the value of intermittent irrigation of ricefields as a means of controlling the breeding of *A. culicifacies* in the Pattukkottai Taluk, South India. The malaria conditions in this once malaria-free part of India, in which the inauguration of an irrigation scheme was responsible for endemic malaria, have been described in previous publications [see this *Bulletin*, 1939, Vol. 36, pp. 131, 787; 1941, Vol. 38, p. 559]. Seven carefully controlled experiments on rented land and two experiments in villages showed that intermittent irrigation under local conditions is an effective measure for controlling mosquito breeding when cycles of five wet followed by 2, 3 or 4 dry days are carried out, except during the period of the north-east monsoon. During the daily rain that may fall in November it is not possible to dry the fields sufficiently to prevent mosquito breeding. This is not very important, for *A. culicifacies* does not breed actively at that time. It has been noted, too, that *A. culicifacies* does not breed actively in ricefields when the rice is a foot high. Dry periods not exceeding four days do not cause cracking or clod formation in the soil of ricefields in Pattukkottai: the surface film disappears but the subsoil remains moist. Intermittent irrigation did not significantly affect the yield of grain or straw or modify the growth of weeds. It seems possible that intermittently irrigated plots may be slightly more susceptible to fungus disease if this be present when the rice has reached the flowering stage; at this stage *A. culicifacies* breeding will have ceased in the fields. Village experience showed that supervision of the ryots would be necessary in carrying out any organized community system of irrigation. *Norman White.*

RAO (R. Bhasker) & RAMOO (H.). **Some Notes on the Practical Aspects of Mosquito Control in Wells and Tanks by the Use of Larvivorous Fish.**—*Jl. Malaria Inst. of India.* 1942. June. Vol. 4. No. 3. pp. 341–347. With 2 figs. on 1 plate.

The authors describe some of their experiences in an endeavour to control mosquito breeding in tanks and wells in Pattukkottai town by stocking them with Gambusia, or with *Panchax parvus*, a local species. There are 1,300 wells in the town, mostly very shallow unprotected wells. About 20 to 25 fish were put into each well, but two weeks later most of them had disappeared. Predatory fish were responsible for the loss in some cases. Chlorination of the water was used to kill the latter. Five to six ounces of "percloron" was sufficient for 800 gallons of water. Larvivorous fish are introduced when all traces of free chlorine have disappeared from the water. Frogs are commonly

found in the wells and have been known to eat fish. In support of this surprising statement a photograph is published showing a fish inside a frog's stomach. [One would imagine such an occurrence to be rare.] A wire screen fixed for a few hours a few inches below the water surface will drown the frogs. Kingfishers are a danger to these larvivorous fish in the very shallow " wells " with no parapets. Other common natural enemies mentioned are water snakes, water turtles, predaceous beetles and giant water-bugs. [It would seem that life is a dangerous business for Gambusia in Pattukkottai ; mosquito larvae have many allies.] *Norman White.*

RAO (R. Bhasker) & RAMOO (H.). **The Control of Mosquito-Breeding in Canal Distributaries by Growing Certain Plants on their Banks.**—*Jl. Malaria Inst. of India.* 1942. June. Vol. 4. No. 3. pp. 409–415.

In the Pattukkottai taluk it was noted that the breeding of *A. culicifacies* was more intense in canals whose banks were devoid of shrubs and creepers than in those where there was a dense marginal growth of such plants. *Ipomea biloba,* a fast growing creeper, is sometimes planted along the embanked portions of a canal to strengthen the bunds ; it acts as a sand binder. It appears to reduce mosquito breeding. Experiments were made with other plants. *Vitex negundo* promises to be useful. It is a quick growing perennial shrub with lateral branches and thick quinque-foliate leaves, which provide shade and mechanical obstruction to the oviposition of mosquitoes. It is easily propagated by cuttings. Significantly fewer larvae were found in a section of a canal whose banks had been so planted than in a control section similar in all respects save its banks' vegetation.

Norman White.

KNIPE (Fred W.) & RUSSELL (Paul F.). **Observations on the Automatic Distribution of Paris Green.**—*Amer. Jl. Trop. Med.* 1942. July. Vol. 22. No. 4. pp. 447–457. With 4 figs.

An automatic machine for the distribution of Pâris green was first used by RUSSELL [this *Bulletin,* 1933, Vol. 30, p. 864] and further developed by RUSSELL & EATON [this *Bulletin,* 1935, Vol. 32, p. 144]. The machine is activated by the S-rotor current wheel invented by SAVONIUS (1931). Ingenious modifications have been made to the original machine, which in its new form has given good results in South India in larva control on slowly moving water currents in irrigation canals. A detailed illustrated description of the apparatus is given. The machine deposits, but cannot distribute, the larvicide, Paris green, 2 per cent. in powdered charcoal. The water current will, however, effectively distribute the larvicide in a canal up to 3 feet deep and not wider than 20 feet, if the velocity of water does not exceed 1·6 feet per second. At this rate of flow, or less, the larvicide penetrates all grassy edges and whirlpools on both sides of the channel for at least 1,500 linear feet.

Another modification of this apparatus was used to distribute Paris-green-kerosene-water emulsion. This is also described. Much ingenuity has gone to the construction of both types. *Norman White.*

KNIPE (Fred W.) & SITAPATHY (N. R.). **Notes on Improvements made to Equipment for Spray-Killing of Adult Mosquitoes.**—*Amer. Jl. Trop. Med.* 1942. July. Vol. 22. No. 4. pp. 429–446. With 10 figs.

In several reports published by Knipe, in collaboration with RUSSELL, or alone, the value of spray-killing adult mosquitoes in the control of rural malaria in South India has been emphasized [see this *Bulletin*, 1940, Vol. 37, p. 504 ; 1941, Vol. 38, p. 645 ; 1942, Vol. 39, pp. 181 & 667]. In those papers descriptions were given of different types of spraying apparatus, and the modifications made in many of them to suit local requirements. In this further publication a very full description is given of the equipment that has been found to be most effective, and of the numerous modifications that have been made. Hand atomizers, hand-pumped pressure tank equipment, self-generating pressure tank equipment, and power-operated equipment are described and well illustrated. A summary of the paper is not possible ; those interested in the subject will find much of value therein.

Norman White.

MUDROW (Lilly). Klinische und parasitologische Befunde und chemotherapeutische Ergebnisse bei der Hühnermalaria. [**Clinical and Parasitological Findings and Chemotherapeutic Results in Fowl Malaria.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1940. June. Vol. 44. No. 6. pp. 257–275. With 3 figs. (1 coloured). [23 refs.]

After two and a half years' experience with *Plasmodium gallinaceum* in fowls infected by blood inoculations or by the bites of mosquitoes, the author has found it possible to draw certain conclusions.

The exoerythrocytic or endothelial stages of development were found, in 30 per cent. of the birds, in the inner organs, particularly the brain. They occurred much more frequently in those that died of the infection than in those that were killed, and similarly more commonly in birds infected from sporozoites than in birds inoculated with blood. The highest percentage of endothelial forms occurred in birds which died after sporozoite infection. They occurred most frequently in birds which died in the first acute attack, while after blood inoculation they were most usually found in the later phases of the infection. As in both groups the endothelial forms were most numerous when the mortality rate was highest, it would seem that the endothelial forms were in some way responsible for the death of the birds.

Microscopic investigation of the site of injection of large numbers of sporozoites has shown that at the end of 24 hours rounded uninucleated extracellular forms occurred, as well as some forms with two nuclei. After 48 hours numerous uninucleate and binucleate forms, free or within mononuclear cells, were found. After 72 hours intracellular forms with four and eight nuclei, as well as uninucleate and binucleate forms, were seen. At 96 hours a larger number of multinucleate forms were seen, as well as groups of sixteen merozoites, evidently the products of schizogony. Up to this time it was not possible to detect pigmented parasites in the red blood corpuscles. The various developmental forms of *P. gallinaceum*, which are similar to the stages previously described by the author for *P. cathemerium*, are illustrated in a coloured plate.

A number of drugs were tested as to a possible action on the endothelial stages. Plasmoquine alone had any effect, for the treated birds

had a lower death rate and generally revealed a reduced number of endothelial forms. It seems to the author that this observation may afford an explanation of the reduced relapse rate in human malaria after plasmoquine medication if, as some maintain, there exist corresponding endothelial stages of development. *C. M. Wenyon.*

CORRADETTI (Augusto). Die neuen Theorien ueber die Pathologie der Malaria im Lichte unserer Kenntnisse von der vergleichenden Biologie der Plasmodien. [**The New Theories on the Pathology of Malaria in the Light of our Knowledge of the Comparative Biology of the Plasmodia.**]—*Deut. Trop. Ztschr.* 1941. Oct. 1. Vol. 45. No. 19. pp. 591–598. [30 refs.]

In this paper the author continues his discussion [this *Bulletin*, 1942, Vol. 39, p. 668] of the exoerythrocytic schizonts which occur in *Plasmodium gallinaceum* infections of fowls and some other malarial parasites of birds. He brings forward experimental data to prove that these particular schizonts are not exclusively derived from sporozoites. They appear as frequently after inoculation of birds with the ordinary erythrocytic forms. He concludes that these schizonts do not indicate a separate cycle of development but represent certain biological characters of those species in which they occur. They are specific for these forms and indicate their capacity to develop in histiocytes as well as in red blood corpuscles. In the case of *P. elongatum* there is development in red blood corpuscles and blood-forming cells but not in histiocytes. In the case of human malarial parasites and, indeed, the majority of malarial parasites, as far as is at present known, development occurs only in the red blood corpuscles. The isolated forms which some observers have regarded as representing exoerythrocytic stages of human malarial parasites are insufficient to establish the existence of such forms. Until evidence as clear as that which has established their existence in *P. gallinaceum* and one or two other species of bird malarial parasites is forthcoming, it is quite unjustifiable to assume that such exist in human malaria, much more so to conclude that they are responsible for the tendency to relapse. The general conclusion is that certain malarial parasites of birds are capable of development in histiocytes, as well as in the red blood corpuscles, and that this is in no way connected with the development undergone by sporozoites, for in the case of most malarial parasites the vertebrate cycles of which are also commenced by sporozoites these histiocyte stages do not occur. *C. M. Wenyon.*

RUSSELL (Paul F.), MULLIGAN (H. W.) & MOHAN (Badri Nath). **Active Immunization of Fowls against Sporozoites but not Trophozoites of** *Plasmodium gallinaceum* **by Injections of Homologous Sporozoites.** —*Jl. Malaria Inst. of India.* 1942. June. Vol. 4. No. 3. pp. 311–319.

In a previous paper [this *Bulletin*, 1942, Vol. 39, p. 300] the authors described experiments which indicated that the injection into fowls of sporozoites of *Plasmodium gallinaceum*, inactivated by 30 minutes' exposure of the salivary glands containing them to ultra-violet radiation, brought about a considerable rise in the agglutination titre of the serum against homologous sporozoites. In the present paper it is shown that the same result can be obtained by the injection of an

emulsion made from dried and ground up thoraces of infected mosquitoes. This is a more rapid and convenient method of preparing sporozoite antigen than is exposure to ultra-violet radiation. The paper shows, furthermore, that the serum of chickens immunized with the dried sporozoite antigen may reach an agglutination titre of 1/32,000 and that such chickens will develop only a mild infection when bitten by infected mosquitoes. There was, however, no protection against the results of intravenous injection of blood containing trophozoites. *C. M. Wenyon.*

RIGDON (R. H.) & THOMAS (W. K. Stratman). **A Study of the Pathological Lesions in *P. knowlesi* Infection in *M. rhesus* Monkeys.**—*Amer. Jl. Trop. Med.* 1942. July. Vol. 22. No. 4. pp. 329–339. With 6 figs. [17 refs.]

The paper gives an account of the pathology of *Plasmodium knowlesi* infection in 26 *Macacus rhesus* which either died of the infection or were killed at some stage of its development. Certain changes are similar to those which occur in human beings dying of severe anaemia. These are dilatation of the cavities of the heart, leading to oedema of the lungs, dilatation of the sinusoids round the central veins of the liver, leading to necrosis of the hepatic cells around the central veins, and parenchymatous degeneration of the kidneys. It seems probable that these lesions in the monkey are the direct consequence of the rapidly progressive anaemia, and consequent anoxaemia, brought about by the infection, an anaemia, the intensity of which is related to the percentage of red blood corpuscles infected. It is in monkeys with a parasite count of over 50 per cent. that the above changes are most evident. Perivascular haemorrhages were present in the central nervous system and their size and frequency varied in different animals. It is possible that these haemorrhages are the result of infarction which otherwise was rarely observed in the series of monkeys studied. Haemorrhages in the adrenals, which are considered by some observers to be significant pathological lesions of malaria, were rarely seen in the animals. Phagocytosis was carried out most actively by the mononuclear cells in the blood vessels and to a less extent by the polynuclears. The leucocytes in general were evenly distributed but in some places small clusters occurred. There was no tendency for leucocytes or parasitized red cells to accumulate on the walls of the blood vessels, nor was there any evidence that the true endothelial cells of the blood vessels or sinusoids were phagocytic. It is suggested that in monkeys infected with the malarial parasite investigated, the severity of the anaemia, the intensity of the infection and the rapidity with which the disease progresses are responsible for myocardial failure, hepatic necrosis and oedema of the lungs. *C. M. Wenyon.*

RAY (J. C.), MUKERJEE (S.) & ROY (A. N.). **Complement-Fixation Reaction in Experimental Animals in Response to *Plasmodium knowlesi* Antigen.**—*Ann. Biochem. & Experim. Med.* Calcutta. 1941. Mar. Vol. 1. No. 1. pp. 101–115.

With antisera prepared in rabbits by the intravenous injection of *Plasmodium knowlesi* antigens it was possible to obtain the reaction of complement fixation. The antigen for stimulating antibody formation in the rabbit was prepared by alternate freezing and thawing of a

suspension of heavily infected red blood corpuscles from a monkey, or by exposing the infected red blood corpuscles to monkey red cell haemolysins prepared by injecting normal monkey red cells into rabbits on a number of occasions. While the freezing and thawing method left a certain amount of corpuscular material adherent to the parasites, the haemolysin method removed all traces of red cells from the parasites, which, by washing and centrifuging, could be obtained in a high degree of purity.

Antigens for the complement fixation test were prepared from saline extracts of the spleen or blood of monkeys during the end stages of an acute infection. With the serum of the immunized rabbits and the antigen it was possible to carry out the complement fixation reaction. In certain cases false positive reactions were obtained. These were due very largely to the presence of traces of blood cells in the antigen used for immunizing the rabbits.

The paper describes experiments with other antigens and discusses the estimation of the titre of the antiserum and other factors upon which a satisfactory complement fixation depends.

C. M. Wenyon.

RODHAIN (J.) & LASSMAN (P.). Le cycle schizogonique de "Plasmodium schwetzi" et l'évolution de ce parasite chez "Anopheles maculipennis" var. "atroparvus." [**Schizogony Cycle of** *P. schwetzi* **and Evolution of the Parasite in** *A. maculipennis* **var.** *atroparvus*.]—*Ann. Soc. Belge de Méd. Trop.* 1940. June 30. Vol. 20. No. 2. pp. 179–186. With 1 chart.

In his previous observations on *Plasmodium schwetzi* of the chimpanzee the author had been able to determine the cycle as at least 36 hours. In the present paper the development of a good infection in a freshly inoculated chimpanzee has enabled him to make further observations. He has been able to follow at least three complete cycles and can now state that each is of 48 hours' duration, as had previously been claimed by REICHENOW, who had also maintained that the parasite was identical with *P. vivax* (which it closely resembles).

The author of the present paper also records his attempts to infect *Anopheles maculipennis* var. *atroparvus*. In all, 280 of these mosquitoes were allowed to feed on the chimpanzee, whose blood contained both male and female gametocytes, the former flagellating readily. Of the mosquitoes fed, 107 were subsequently dissected. Oöcysts were found in only three, and two of these were mature and contained sporozoites. In no case was a salivary gland infection noted. A feature of the oöcysts was their large size, the two mature ones measuring 88·8μ by 72·8μ and 76·8μ by 65·6μ. This shows them to be larger than those of *P. vivax*, which have an average diameter of 48μ and do not exceed a measurement of 66μ by 58·5μ. It seems clear that *A. maculipennis* is not a very satisfactory host for *P. schwetzi*, the oöcysts of which, on the basis of the admittedly meagre observations recorded in the paper, are larger than those of *P. vivax*. *C. M. Wenyon.*

TRYPANOSOMIASIS.

RODHAIN (J.), VALCKE (G.) & VAN GOIDSENHOVEN (Ch.). Considérations sur le diagnostic et la thérapeutique de la méningo-encéphalite trypanosomique humaine d'après l'observation de quatre Européens atteints de la maladie du sommeil. Existence dans le sang et le liquide encéphalorachidien des malades de sensibilisatrices fixant le complément. [**Diagnosis and Treatment of Trypanosomal Meningo-Encephalitis : Complement-Fixing Substances in Blood and Cerebrospinal Fluid.**]—*Ann. Soc. Belge de Méd. Trop.* 1941. Sept. 30. Vol. 21. No. 3. pp. 195–220. [18 refs.]

The first part of this paper comprises clinical notes on four cases of advanced nervous infection of Europeans by *T. gambiense.* Noteworthy features are :—

(1) The slow evolution frequently noticed—actually eight years in one case before diagnosis.

(2) Success of the synergic treatment by repeated courses of Bayer 205—Tryparsamide and tartar emetic. The one case not apparently cured had previously been treated with M. & B. 800 [Pentamidine or 4 : 4′ diamidino diphenoxy pentane] in Sierra Leone.

(3) The difficulty of diagnosis in the absence of trypanosomes in the cerebrospinal fluid, blood or gland juice. Colloidal tests of the cerebrospinal fluid do not distinguish from syphilis of the central nervous system as both give paretic type curves. Mott's morula cells favour trypanosomiasis.

The second part deals with efforts to estimate the value of a complement fixation test in the blood and cerebrospinal fluid using an antigen made from *T. equiperdum* as in the diagnosis of dourine.

(1) The blood of all three tested patients was positive.
(2) The cerebrospinal fluid of two was positive, the third equivocal.
(3) The cerebrospinal fluid became negative after treatment.

The possibility of the test being developed for diagnosis and as a criterion of cure is discussed. *C. C. Chesterman.*

LEISHMANIASIS.

KOWALZIG. Ueber Kala-Azar-Beobachtungen in Spanien. [**Kala Azar in Spain.**]—*Deut. Trop. Ztschr.* 1941. May 15. Vol. 45. No. 10. pp. 302–307.

The author describes five cases of kala azar in German soldiers who were with the foreign legion in Spain during the civil war. It appeared that infection occurred during the summer of 1938, the first symptoms becoming evident during the succeeding winter. Four of the patients recovered under neostibosan treatment carried out in Spain. The fifth case, which was far advanced when diagnosis was made in Berlin, terminated fatally. *C. M. Wenyon.*

DRENOWSKY (A. K.). Bemerkungen ueber Hundeleishmaniosis im Distrikt Petritsch. [**Canine Leishmaniasis in the Petrich District.**] —*Deut. Trop. Ztschr.* 1941. Nov. 15. Vol. 45. No. 22. pp. 690-692.

An examination of the blood serum of 100 dogs in the Petrich district of Bulgaria by the formol gel reaction has shown that 51 per cent. are strongly positive, 30 per cent. positive and 19 per cent. negative. In the strongly positive group the sera became opalescent and solid in 15 minutes, while in the positive group this result was obtained in up to six hours. It is concluded from these results that canine leishmaniasis is widely spread in the district.

C. M. Wenyon.

BRAHMACHARI (Upendranath) & BASU (Charu Chandra). **Ulcerating Type of Dermal Leishmanoid with Pseudo-Arthritis and Ichthyotic Condition of the Skin.**—*Jl. Trop. Med. & Hyg.* 1942. June 1. Vol. 45. No. 11. pp. 81-82. With 4 diagrams (1 coloured) on 2 plates.

The case reported is that of an Indian who was admitted to hospital in Calcutta suffering from dermal leishmaniasis which developed two years after apparent cure of kala azar. The condition was unusual as, in addition to cutaneous nodules, there were ulcers between the eyebrows, on the upper lip and on the middle finger of the right hand. Leishmania were found in scrapings from the ulcers. There was extensive erythema of the face and an ichthyotic skin eruption over the chest and abdomen. The finger with the ulcer was swollen, but though this appeared to be due to arthritis, X-ray examination revealed a normal joint. One course of urea stibamine brought about a disappearance of the skin lesions, but relapse occurred. The skin lesions are again responding to a second course of the drug.

C. M. Wenyon.

NAPIER (L. Everard), SEN GUPTA (P. C.) & SEN (G. N.). **The Treatment of Kala-Azar by Diamidino Stilbene : Analysis of 101 Cases.**—*Indian Med. Gaz.* 1942. June. Vol. 77. No. 6. pp. 321-338. With 8 figs. [16 refs.]

In this paper the authors give an account of their experience in the treatment of 100 cases of kala azar with stilbamidine (4 : 4′-diamidino stilbene). The patients, who were mostly Indians, varied in age from under one year to over 45. They were in all stages of the disease, which in about half was of over six months' duration. In all but two typical cases the diagnosis was confirmed by discovery of the parasite in smears from spleen, sternum or tibia puncture, or by culture of the puncture material. Spleen puncture was the most reliable method. In 74 of the 100 cases the aldehyde test was positive.

The drug was administered intravenously in a 1 per cent. solution in distilled water in 95 of the cases. In the remaining five cases it was given intramuscularly, but this proved to be very painful. Injections were given daily. In over 90 of the cases, in which no previous treatment had been given, 10 or 12 doses were given. In the others, which were resistant cases, up to 15 injections were given.

The dose finally adopted for adults was an initial dose of 0·025 gm. followed by doses of 0·050, 0·060 to 0·075, according to reaction, 0·090 and 0·100 gm. up to a maximum of 1 mgm. (0·001 gm.) per pound of body weight. In small children the initial dose was 0·010 gm. up to a slightly higher dose than 1 mgm. per pound of body weight, as children tolerated the drug better than adults. The mean total dose given in ordinary cases was 0·597 ± 0·245 gm., while in resistant cases it was 0·884 ± 0·414 gm. Per 100 lb. of body weight the mean total worked out at 0·912 ± 0·224 for ordinary cases and 1·009 ± 0·293 for resistant cases.

The reactions following administration of the drug are troublesome and sometimes alarming but apparently free from danger. About a quarter of the cases had severe reactions, half mild reactions, while the remaining quarter were not wholly free from unpleasant sensations. After the injection of the drug the blood pressure nearly always showed a marked drop, which was sometimes very alarming. It was found that this could be controlled by giving an injection of 0·25 cc. of 1 in 1,000 adrenalin just before the administration of the drug.

Of the patients treated, 98 were cured and two died. Of the 98 two relapsed, and of these one received a second course of the drug. After treatment the haemoglobin showed a 50 per cent. increase, while the leucocytes were below 4,000 in only 13 of the cases, whereas they were below this level in 76 of the cases before treatment.

It is concluded that the introduction of stilbamidine has made a very great advance in the treatment of kala azar. The results of treatment compare very favourably with those produced by neostibosan. Antimony-resistant cases respond to the drug about as favourably as ordinary cases. Weight for weight, only about a quarter as much stilbamidine is required per case as neostibosan. In a mixed population 60 gm. should be sufficient to cure 100 patients, or 90 gm. to cure 100 patients of an average weight of 100 lb. The drug does not appear to be of any value in the treatment of dermal or cutaneous leishmaniasis. *C. M. Wenyon.*

HENRY (A. J.) & GRINDLEY (D. N.). **Fluorescence and Adsorption of Stilbamidine and its Estimation in Biological Fluids.**—*Ann. Trop. Med. & Parasit.* 1942. Sept. 30. Vol. 36. No. 3. pp. 102–112.

This investigation was carried out at Khartoum, in order to study the fate of stilbamidine (4 : 4′-diamidino stilbene dihydro-chloride) which is used in the Sudan for the treatment of kala azar. As was reported by HAWKING and SMILES [this *Bulletin*, 1942, Vol. 39, p. 238] stilbamidine is strongly fluorescent in ultraviolet light. The present authors found that it was also absorbed very tenaciously by filter paper, the spot on the paper showing bright fluorescence. This method can be used for estimation, the spot produced on the paper by a drop of the unknown solution being compared with spots produced by drops of known concentration. Alternatively a more orthodox chromatographic method may be used, the unknown fluid being percolated through a column of cellulose pulp; the stilbamidine is adsorbed in the upper layers of the column, which are removed according to their fluorescence and subjected to the Kjeldahl process to estimate the nitrogen content of the adsorbed stilbamidine. The effect of many substances on the fluorescence of stilbamidine was studied. The

addition of oxalate causes a white precipitate and diminution of fluorescence; citrate has no effect. When solutions of stilbamidine are slowly added to normal saline, a precipitate appears, which redissolves on shaking; this observation is relevant to the optimum rate for intravenous injection. The stilbamidine is adsorbed on filter paper as the free base, the hydrochloric acid being neutralized by mineral impurities present in the paper, and it can be washed out again by acid.

The technique of estimation is as follows:—

A standard Dreyer pipette is used, fitted at the top with a short piece of rubber tubing, the end of which is closed with a glass rod and a screw clip. By unscrewing and screwing the clip, liquid is drawn into the pipette and then (the pipette being held vertical in a clamp) a drop is expelled on to a piece of filter paper placed horizontally 1 cm. below the pipette. No. 50 paper is very suitable. The drop is allowed to soak freely into the paper, and is allowed to dry. It is then compared under ultra-violet illumination with spots prepared from a series of known concentrations. When once a solution of stilbamidine, whether in water or a biological fluid, has been spotted out, the fluorescence of the spot seems to be quite permanent, at any rate for more than two months. This allows a permanent record to be kept, and examination under the lamp can be deferred until convenient. [This permanence is surprising, since solutions of stilbamidine show marked "quenching" of the fluorescence under continued ultra-violet illumination; presumably it is advisable to keep the papers dry and in the dark.] It may be necessary to dilute the unknown fluid so as to bring it within the appropriate range, *i.e.* less than 5 mgm. per 100 cc.; in this case the dilution should be effected with the same fluid as that being examined, *e.g.*, urine should be diluted with urine. The average error of this test is about 25 per cent.

In certain cases, such as highly coloured solutions and solutions with considerable solid matter in suspension, it is necessary to wash the filter paper under the tap for about five minutes after the liquid has been absorbed, in order to remove interfering colouring matter or suspended solid. By this technique, concentrations of 1 in 2 million can be detected in urine in spite of the presence of other substances which fluoresce. Since the fluorescent spots obtained with stilbamidine dissolved in urine are somewhat different from those obtained with solutions in water, it is necessary to prepare a series of standards dissolved in urine for the comparison. If the urine is alkaline and consequently cloudy, the test is not affected, so long as the concentration of the compound is low and the suspended matter is not permitted to settle. The urine should be well shaken before it is diluted or used for the test.

The test is readily applicable to estimations in blood serum, plasma, or cerebrospinal fluid; in milk the accuracy is less, the lowest detectable concentration being 0·25 mgm. per 100 cc. A table (below) is given showing the urinary excretion of two men after each had received a single intravenous injection (apparently of 100 mgm.) at 8·0 a.m.

It is seen that the rate of excretion in the urine rapidly falls and that after about 2½ days excretion becomes undetectable; the total amount excreted is about 10 per cent. of that injected.

When stilbamidine is added to citrated blood, about 85 per cent. of the drug is adsorbed by the corpuscles and cannot be recovered by haemolysis, or by various other methods. It is probable that much

First subject			Second subject		
Time	Concentration of drug (mgm. per 100 cc.)	Total drug per sample (mgm.)	Time	Concentration of drug (mgm. per 100 cc.)	Total drug per sample (mgm.)
			4.3.42		
8.35	4	0·4	9.50	3·5	4·5
10.00	5	3·75	12.15	1·8	1·7
11.30	0·7	0·85	13.12	0·75	0·5
	0·5		15.40	0·2	0·15
	0·7		18.40	0·2	0·2
Remainder of first day	0·6	3·6			
	0·6				
	0·5		*5.3.42*		
			2.35	0·15	0·5
	0·4		6.20	0·15	0·3
Second day	0·3		9.00	0·1	0·1
	0·2	2·2	11.50	0·1	0·2
	0·2		16.00	0·1	0·15
			19.00	0·08	0·05
Third day	0·2	0·6			
	Slight				
	Negative		*6.3.42*		
			5.10	0·08	0·25
	Total drug excreted	11·4 mgm.	11.40	0·06	0·1
			Not given	0·05	0·2
				Negative	
				Total drug excreted	8·9 mgm.

of the compound which disappears after injection is adsorbed by the corpuscles in some form which is dissociated only very slowly.

[If stilbamidine is adsorbed by the red corpuscles it is probably in some non-fluorescent form, since the corpuscles of mice, treated with stilbamidine, do not show up in blood films examined by the fluorescence microscope.] *F. Hawking.*

CUPI (Nino) & CATTAPAN (Altino). Contributo allo studio del bottone d'Oriente nel Governo dell' Amara. (Osservazioni cliniche.) [**Clinical Observations on Oriental Sore in Amara, Eritrea.**]—*Boll. d. Soc. Italiana di Med. e Igiene Trop.* (Sez. Eritrea.) Asmara. 1942. Vol. 1. No. 2. pp. 19–24. English summary (8 lines).

In this paper are briefly described a number of cases of oriental sore which the authors encountered in the Amara province of Eritrea. For treatment FLARER's method of local injections of a solution of atebrin was adopted. This gave satisfactory results both as regards the rapidity of cure and the inconspicuousness of the resulting scar.

C. M. Wenyon.

MARCHIONINI (Alfred). Die Behandlung der Orientbeule (Hautleishmaniose). [**Treatment of Oriental Sore.**]—*Schweiz. Med. Woch.* 1941. Oct. 18. Vol. 71. No. 42. pp. 1220–1223. With 4 figs. [18 refs.]

The author gives an account of his experience with oriental sore, based on 300 cases treated by him in Ankara. Early typical cases in which leishmania are demonstrable respond to local treatment by injection, around or into the lesion, of 1–2 cc. of a 10–20 per cent. solution of atebrin. The treatment may have to be repeated once or twice after intervals of 8 to 10 days. When multiple sores are present the atebrin is administered intravenously, or better, intramuscularly. The first dose is 0·1 gm. and this is increased after two days to 0·2 gm. and two days later to 0·3 gm. Two or three further injections of 0·3 gm. are given. Atebrin treatment is effective in the early typical cases but fails to cure the many atypical chronic cases, of which there are numerous varieties in which leishmania cannot be found. For these a number of different treatments have to be tried, including injections of antimony derivatives, local applications of rivanol or trypaflavin, mercury or bismuth ointment. In other cases electro-coagulation treatment or deep infiltration with Röntgen rays must be adopted. In some cases it was found that there was no response to treatment till a chronic malarial infection had been dealt with by administration of quinine. Similarly when there was concomitant lupus or syphilis these infections had to be treated by their own appropriate remedies.

C. M. Wenyon.

GARZON (Rafael) & MOLINA (Rodolfo J.). A proposito de un caso de leishmaniosis tegumentaria americana. Consideraciones clínicas, diagnósticas y terapéuticas. [**A Case of American Muco-Cutaneous Leishmaniasis.**]—*Rev. Argentina de Dermatosifilologia.* 1942. Vol. 26. Pt. 2. pp. 225–247. With 8 figs. [29 refs.]

The authors describe in detail a case of muco-cutaneous leishmaniasis which was under treatment in the Hospital San Roque, Tucumán, in N. Argentina. The patient was an Italian, 43 years of age, whose illness commenced with an insect bite on the left foot. Later a lesion appeared on the ear, while the rhino-pharyngeal mucosa became involved. The clinical and pathological features of the case are recorded and illustrated by a series of photographs. Treatment with intravenous tartar emetic brought about considerable improvement, the ulcers showing signs of healing from the periphery towards the centre. *C. M. Wenyon.*

FEVERS OF THE TYPHUS GROUP.

SONNENSCHEIN. Das Fleckfieber als Kriegsseuche. [**Typhus in Wartime.**] [Abstract of paper read at Prague on 13th Feb., 1942.] —*Deut. Med. Woch.* 1942. Aug. 7. Vol. 68. No. 32. p. 808.

At this meeting Sonnenschein gave the following figures of the incidence of typhus. It will be noted that, in general, they do not

greatly differ from those quoted from American sources in this *Bulletin*, 1942, Vol. 39, p. 655.

	1940		1941	
	Cases	Deaths	Cases	Deaths
Germany	556	95	1,969	326
Rumania	969		1,686	
Hungary	83		699	20
Bulgaria	132	14	194	14
Yugoslavia...	195	18	164	15
Greece	30	1		
Spain			5,862	939
Poland (German-occupied) ...	7,900	5·6 per cent.		

C. W.

LEAGUE OF NATIONS: HEALTH SECTION. WEEKLY EPIDEMIOLOGICAL RECORD. 1942. Sept. 24. Vol. 17. No. 39 [R.H. 865]. p. 220. [**Typhus in Germany.**]

According to Communiqué No. 721 from the Office International d'Hygiène Publique, Paris, there were 1,270 cases of typhus reported from Germany between April 5th and July 4th, 1942, distributed as follows:—

Prussia, 672; Bavaria, 157; Saxony, 41; Württemberg, 71; Baden, 13; Hamburg, 110; Thuringia, 22; Hesse, 10; Mecklenburg, 17; Brunswick, 15; Oldenburg, 2; Bremen, 6; Anhalt, 13; Schaumburg-Lippe, 1; Lower Danube, 1; Upper Danube, 11; Carinthia, 3; Styria, 38; Vienna, 48; Sudetenland, 19.

PRIMITIVO DE LA QUINTANA. Das Fleckfieber in Spanien. [**Typhus Fever in Spain.**]—*Ztschr. f. Hyg. u. Infektionskr.* 1942. May 16. Vol. 123. No. 6. pp. 665–674. With 6 figs.

From 1901 to 1922 typhus fever was relatively common in Madrid and some of the south-eastern provinces of Spain. The highest peaks were—1904 (400 deaths), 1909 (671) deaths, 1913 (243 deaths) and 1919 (227 deaths). From 1922 to 1938 there were never more than 16 deaths in any year. Madrid has always been the chief focus of infection.

During the civil war Spain was remarkably free from typhus fever, but immediately after the end of the war, early in 1939, cases began to occur in the south-eastern provinces. Early in 1940 fairly severe epidemics occurred in Granada and Seville; at the end of the same year there were fresh outbreaks in Murcia and Almeria. In January 1941, Madrid and several south-eastern provinces were affected as well as a few other parts of Spain. Altogether, in 1941, about 7,000 cases were reported in Spain, with a case-mortality rate of 13 per cent. There were 2,266 cases in the city and province of Madrid; in the city the disease suddenly flared up towards the end of March and rapidly reached the peak of 154 cases weekly by the middle of April. It declined to a weekly rate of 50 to 60 cases in May and June, and from

about the middle of August there were less than 10 cases weekly. The chief features of the age distribution were the rarity of cases under the age of five and the very low case-fatality rate under the age of 25.

Systematic measures of prevention were only possible in Madrid, and even there great difficulties were encountered owing to malnutrition, poverty, movements of population, and depletion of the medical and sanitary personnel.

Various vaccines were tried. Laigret's live attenuated murine vaccine was ineffective; in one prison 300 persons were vaccinated but there were 25 attacks and two deaths. Cox's egg-yolk vaccine could not be satisfactorily tested, but there was evidence that it greatly reduced the severity of the disease in workers at a research institute who suffered from attacks resulting from laboratory infection. Durand and Giroud's rabbit-lung vaccine also was not fully tested but at any rate it was quite harmless. A good impression was created by a vaccine received from Prof. Otto of Frankfurt-on-Maine [see below, p. 129]; 200 doses were given to members of a staff specially exposed to risk and no attacks followed, but as the epidemic was coming to a close no definite conclusions could be drawn. *John W. D. Megaw.*

CASTAÑEDA (M. Ruiz). Alrededor del problema etiológico del tifo exantemático. [**The Aetiological Problem of Exanthematic Typhus.**]—*Día Médico.* Buenos Aires. 1942. June 22. Vol. 14. No. 25. pp. 559–565. [45 refs.]

This is a general review of the problem with special reference to Mexico and the rest of the American continent. Its chief interest lies in the opinions expressed by a worker who has been engaged for more than 10 years on intensive research in the subject.

The author believes that a systematic investigation would undoubtedly show murine typhus to be present in mild form throughout Mexico. He recommends the use of rapid bedside modifications of the Weil-Felix test as the best means of obtaining information on this subject.

Reference is made to the "pinareño" typhus of Cuba, the Rickettsia of which protects against murine typhus but causes neither febrile nor scrotal reactions in guineapigs. It is transmissible through these animals for only a limited series of passages. Clinically the disease is related to the mild typhus of the tropical parts of Mexico.

Probably there is a whole gamut of types of Rickettsiae, varying with the climatic conditions and showing every intermediate stage between the typically murine and the typically classical forms.

The early work of Castañeda, ZINSSER and others suggested that the murine strain did not protect against classical typhus, but later research showed that the richer vaccine prepared from rat and mouse lungs was fully protective. This rich vaccine has been shown to be effective against the Bolivian louse-borne typhus in human beings.

No clinical distinction exists between murine and classical typhus; both orchitic and non-orchitic strains of Rickettsiae may cause mild or severe attacks. The striking differences in the animal reactions caused by these can be explained on the hypothesis that murine strains become modified after a number of passages through human beings. Comparable modifications are known to occur in the viruses of rabies and yellow fever, in which also the immunizing properties of the virus are not altered by the fall in virulence. The author reports

that he and HUDSON have now prepared, from horses infected with a murine strain, a serum which is about 16 times more potent than convalescent human serum. The immunological differences between murine and classical strains of Rickettsiae become less and less evident with the continued improvement in the methods of testing cross immunity ; the murine strain is preferable because it lends itself more readily to the preparation of vaccines.

Castañeda proposes the following classification of the human Rickettsial fevers, but he makes no mention of trench fever.

(1) The Rocky Mountain fever type including São Paulo typhus, Tobia typhus and boutonneuse fever.

(2) Exanthematic typhus, including murine typhus, tabardillo, Manchurian typhus, atypical murine typhus, classical or European typhus and Brill's disease.

(3) Tsutsugamushi ; Japanese and Malayan.

(4) The Q fever of Queensland and America.

The immunological relationships between the fevers of these different groups are held to be much closer than is generally believed. For example, PARKER in 1933 isolated from a tick a strain which immunized guineapigs against typhus fever as well as against Rocky Mountain spotted fever, and Castañeda himself has found that a Rocky Mountain strain which caused a fatality rate of 90 per cent. in normal guineapigs killed only 20 per cent. of guineapigs which had recovered from either murine or classical typhus fever. He also found that after passing the Rocky Mountain strain from one immunized guineapig to another by successive inoculations, it gradually lost its virulence for the immunized animals, but when the strain was again transferred to normal animals it was as deadly as before. Comparable results were obtained when guineapigs immune to Rocky Mountain fever were inoculated with Rickettsiae of classical typhus. It will be interesting to investigate the question whether the same close immunological relationship exists between the other groups of Rickettsial diseases.

In summing up, the author affirms the aetiological unity of the various forms of exanthematic typhus, including flea-borne typhus.

A bibliography is appended in which 45 references are given to articles dealing with the problem ; all but four of these have appeared in North and South American journals and most of them have already been abstracted in this *Bulletin.*

[The author appears to be a firm believer in the essential unity of louse-borne, flea-borne, tick-borne and mite-borne Rickettsial fevers, excepting trench fever which is not discussed, but like most Americans he avoids the use of the name typhus for the tick-borne and mite-borne fevers.] *John W. D. Megaw.*

CASTAÑEDA (M. Ruiz). **Bivalent Typhus Vaccine of High Immunizing Value.**—*Science.* 1942. Sept. 25. Vol. 96. No. 2491. p. 304.

The author states that vaccines of epidemic typhus strains have little protective value against infection with murine strains, but that by increasing the antigenic content of the murine vaccine it is possible to immunize against both murine and epidemic typhus. The cultivation of murine Rickettsiae in the lungs of rats gives larger amounts than are possible with the epidemic Breinl strain, but a Mexican epidemic strain has been found which grows well in the lungs of mice and which has a high protective value. Vaccines from the mouse lung

epidemic strain and from rat lung murine strains, when mixed, constitute the bivalent vaccine ; the antigenic composition can be altered at will. The final concentration, for human use, has a turbidity between 1 and 2 on the McFarland scale ; the doses are 0·5 cc., 1·0 cc., 1·0 cc., at weekly intervals, but for laboratory workers five doses should be given.

In a field trial of immunization with a murine strain alone, in Mexico, it was found that cases of typhus occurred after the inoculations had been completed ; this led the author to suspect that cross protection between murine vaccine and some epidemic strains was insufficient, and caused him to consider the addition of epidemic antigen, as described above. *C. W.*

OTTO (R.) & BICKHARDT (R.). Weitere experimentelle Untersuchungen ueber Schutzimpfstoffe gegen Flecktyphus. Impfstoffe aus rickettsienhaltigen Mäuselungen. [**Further Experimental Investigations into Protective Vaccines against Typhus Fever.**]—*Ztschr. f. Hyg. u. Infektionskr.* 1942. May 16. Vol. 123. No. 6. pp. 717–724. With 2 figs. [13 refs.]

Guineapigs were used in carrying out rather severe tests of the efficacy of several types of killed vaccines. The number of animals used in testing each kind of vaccine is given in brackets. The vaccines were—mouse-lung (11) and fowl yolk-sac (22) vaccines made at the Institute at Frankfurt, Giroud's rabbit-lung vaccine (4), a vaccine made from the embryonic tissues and yolk-sacs of developing chicks (3), and Cox's original yolk-sac vaccine (13). Altogether 29 control guineapigs were used. The vaccine made from combined embryonic tissue and yolk-sacs had little protective value : a vaccine of this type described as " Otto and Wohlrab vaccine " has already been reported by Mrugowsky as being of doubtful value for human beings. All the other types gave a good degree of protection to the experimental animals. Technical details are given of the method employed in preparing the mouse-lung vaccine. A rich suspension of *Rickettsia prowazeki* was first obtained from yolk-sacs of developing chick embryos ; this was inoculated, under anaesthesia, by the nasal route into white mice. After repeated lung passages in the mice a fatal massive pneumonia resulted regularly from the inoculation and smears of the lungs contained large numbers of Rickettsiae ; suspensions of the triturated lungs were made in normal saline containing 0·5 per cent. phenol. Each mouse yielded 10 to 15 cc. of vaccine, of which the total dose for human beings was 2 cc. given in doses of 0·5, 0·5 and 1·0 cc., at five-day intervals. In some cases half of these doses was given to guineapigs, in others full doses, at the same intervals. Three to four weeks later each of the inoculated animals and controls was given an intraperitoneal injection of a passage strain of *R. prowazeki*, containing 1–200 of the brain of a guineapig killed on the third day of fever. This large dose regularly caused a typical attack of fever in the control animals after a seven to eight day incubation period.

The authors had no personal experience of the value of the vaccine in human beings, but on the strength of their animal experiments they are now issuing mouse-lung vaccine in addition to the yolk-sac preparation. Reports suggest that the mouse-lung vaccine causes even milder local and general reactions in man than yolk-sac vaccines.

The relatively poor results from the combined embryonic-tissue and yolk-sac vaccines are believed to be due to the poverty of the embryonic tissues in Rickettsiae.

[The investigation described in this paper was carried out at the State Institute for Experimental Therapy and Chemo-therapeutic Research at Frankfurt-on-Main, which is one of the chief sources of supply of anti-typhus vaccine in Germany. The report confirms existing impressions that egg-yolk and animal-lung vaccines are likely to give some degree of protection to human beings and that no final verdict can yet be given as to which of the two types of vaccine is the better.]

John W. D. Megaw.

MACKENZIE (Melville D.). **The Louse in Relation to Typhus Fever.**—*Jl. Roy. San. Inst.* 1942. Oct. Vol. 62. No. 4. pp. 177–181.

KUNERT (H.) & BUCH (E.). Erfahrungen mit der Weil-Felix-Reaktion. [**Experiences with the Weil-Felix Reaction.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1942. Aug. 20. Vol. 102. No. 2. pp. 133–152.

The authors have taken full advantage of the abundant opportunities now available to German workers for investigating the potentialities and limitations of the Weil-Felix test. They regard the test as being based on a genuine antigen-antibody reaction whose value in the diagnosis of typhus fever is indisputable.

Most observers in endemic areas regard a titre of 1–200 as diagnostic, one of 1–100 as suggestive, and one of 1–50 as negative, when readings are made after two hours at 37°C. Low titres, up to 1–50, are often found in persons living in endemic localities, and these titres are frequently increased in cases of typhoid, paratyphoid, undulant fever, tuberculosis, dysentery and trachoma; probably also in other infections such as pneumonia and influenza. In the same way the Widal reaction may become positive in cases of typhus fever, even when the patients have never had typhoid fever, so that practical difficulties arise in the differential diagnosis between typhus and typhoid.

As has already been shown by Felix, the titre of the anamnestic Weil-Felix reactions seen in cases of typhoid fever does not continue to rise after the first week, whereas the Widal reaction, which at first is often negative, becomes positive in rising titre.

In the present experiments three different strains of *Proteus OX19* were used, (1) the Frankfurt strain, (2) a mixture of the old and new Warsaw strains, and (3) a mixture of the old and new Cracow strains. Differences occurred in the titres of agglutination observed with these three strains when used in testing the same sera, but only in a few cases were these differences pronounced.

Sera of 45 healthy persons living in typhus-free areas were tested: 10 of these gave positive reactions against one or more of the three strains of *OX19*, but only in titres of 1–25.

Sera of 211 German immigrants from Bessarabia (a rural endemic area) to Litzmannstadt (an urban endemic area) were tested. In one group of 40 of these, three had titres of 1–100 or over and 12 had titres of 1–50 against one or more of the strains of *OX19*. In another group of 77 of these persons four had titres of 1–100 or over, 27 had titres of 1–50 and 16 titres of 1–25. In this group three had positive Widal reactions, 1–100, and three, 1–50; one agglutinated the Flexner

bacillus, 1–200; four at a titre of 1–100 and 12 at 1–50; only three agglutinated the Shiga bacillus and that at a titre of 1–25. The other groups gave very similar types of response. Dealing only with the Weil-Felix reactions, no less than 110 (52 per cent.) of the 211 sera agglutinated *OX19*: in 102 cases the titre was 1–25 to 1–50, in the remaining eight it was 1–100 or over, against one or more of the three strains.

Sera of the Polish inhabitants of Litzmannstadt were tested: 222 (73·9 per cent.) were positive to *Proteus OX19* at titres of 1–25 or over. From these sera 161 were selected as coming from persons with completely negative histories of typhus, typhoid and dysentery; the readings were made after 20 hours at room temperature and so reacted in higher titres than would have been observed if the reading had been made after two hours. The following results were obtained:—

Positive against *Proteus OX19* only	22
,, ,, *OX19* and typhoid	1
,, ,, *OX19* and Shiga	7
,, ,, *OX19* and Flexner	42
,, ,, *OX19*, Shiga and Flexner	56
,, ,, *OX19*, typhoid and Flexner	10
,, ,, *OX19*, typhoid and Shiga	7
,, ,, *OX19*, Shiga, Flexner and typhoid ...	16

Most of the readings ranged between 1–25 and 1–200.

The findings suggested to the authors that in the presence of co-agglutinins, Weil-Felix titres below 1–200 were hardly reliable.

Sera of 191 persons with strongly positive Wassermann reactions were tested: 164 of these agglutinated *Proteus OX19* at varying titres; five of them at a titre of 1–400 although there was no history of attacks of typhus.

During the investigation of typhus fever at Litzmannstadt 5,483 patients, known or suspected to be suffering from typhus, were tested, with the following results:—1,062 gave positive reactions for typhus only; 1,074 reacted to typhoid only; and 1,041 to both typhus and typhoid. In the group of 1,062 patients whose sera reacted only to *Proteus OX19*, bacilli of the typhoid group were cultured from the blood of 132; in 107 of these cases the Weil-Felix reaction was positive in titres ranging from 1–200 to 1–1,600. In the group of 1,074 who reacted only to typhoid, positive blood cultures of typhoid organisms were obtained in 168, including 48 cases in which the Widal titres were as low as 1–50 to 1–100.

A table is given of the cases in which both the Widal and Weil-Felix reactions were positive: the examples below show the general trend of the findings, but the days of the disease on which the blood examinations were made are not stated.

A group of 191 persons with strongly positive Wassermann reactions was examined: no less than 164 of these agglutinated *Proteus OX19*, but the titres are not stated.

The frequent occurrence of agglutination of typhoid and dysentery bacilli by the sera of persons who give positive Weil-Felix reactions points to anamnestic increases in the agglutinins, owing to previous infections by the organisms concerned; so also it is necessary to take into account the occurrence of anamnestic reactions to *Proteus OX19* resulting from previous attacks of typhus fever. When anamnestic reactions can be excluded, Weil-Felix titres of 1–200 are diagnostic,

Number of cases	Titre of Agglutination		Typhoid bacilli cultured from the blood
	Proteus OX19	Typhoid	
135	1–50	1–50	6
165	1–50	1–100	24
127	1–50	1–200	25
63	1–100	1–100	7
66	1–100	1–400	18
20	1–200	1–100	2
23	1–200	1–200	4
21	1–200	1–800	7
35	1–800 or more	Varying titres	2*

* In one of these the Widal was positive, 1–100; in the other the Weil-Felix titre was 1–6,400 and the Widal 1–25; presumably both cases were mixed infections, but the authors hold that Weil-Felix titres as high as 1–400 may be non-specific and that Widal reactions in the same high titre may also be non-specific.

and titres of 1–100 are suggestive of typhus. Repeated tests are the best means of excluding the fallacies due to anamnestic reactions.

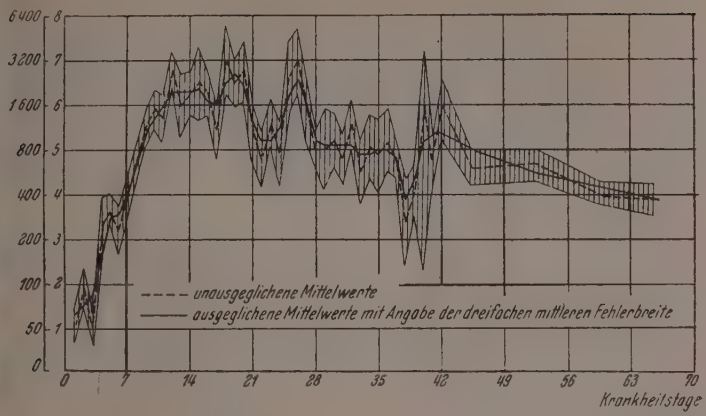
John W. D. Megaw.

SCHÜTZ (F.) & MESSERSCHMIDT (T.). Eintritt und Verlauf der Weil-Felix-Reaktion während der ersten 10 Krankheitswochen beim Fleckfieber. [**The Onset and Progress of the Weil-Felix Reaction during the First Ten Weeks in Typhus Fever.**]—*Klin. Woch.* 1942. Aug. 29. Vol. 21. No. 35. pp. 772–773. With 2 figs.

An interesting survey of the rise and fall of the Weil-Felix titre in typhus fever has been prepared by analysing 987 observations on a large, but unspecified, number of patients. In most of the cases four or five observations were made, but sometimes as many as 20 tests were carried out, at intervals up to 70 days from the onset. Cases in which the titre was less than 1–200 were excluded.

One curve shows the percentage of cases in which titres of 1–200 or over were first observed. The curve shows a very rapid rise in the percentage of positives up to about the 10th day; then the curve rises less steeply and reaches its peak about the middle of the 3rd week; thereafter it falls slowly but remains at a high level till the end of the 10th week. On the 3rd day 30 per cent. were positive 1–200 or over; on the 4th day 48 per cent.; on the 5th day 59 per cent.; on the 6th day 60 per cent.; on the 7th day 65 per cent.; in the 2nd week the percentage of positives rose to 91 per cent. and in the 3rd week to 99 per cent. A curve on the same lines, but based on titres of 1–400 or over, followed the same general course, but naturally at a rather lower level.

In another curve the average titre of the reaction at various stages is shown. Between the 3rd and 4th days this was 1–100; between the 4th and 5th day it was 1–200; by the 7th day 1–400; by the 11th day 1–1,600; after the 11th day there was a slight further rise till the middle of the 3rd week when a gradual but very irregular fall began and continued till the end of the period of observation. Between the



Average titre of the Weil-Felix reaction during the first 10 weeks in Typhus Fever (987 observations).

- - - - unweighted mean
——— weighted mean, (with ± three times the standard error).

[Reproduced from the *Klinische Wochenschrift.*]

3rd and 7th week there were very pronounced ups and downs in the titre, not only in many individual cases but also in the smoothed curve showing the average titres on each day of the disease. The absence of information as to the number of observations on which each part of the curve is based detracts from the value of the graph, but the unexplained irregularities that occurred in many individual cases are well shown by twelve examples which, according to the authors, could be multiplied indefinitely. Two samples are as follows, the figures in brackets give the day of the disease, the accompanying figures show the titres of agglutination :—

I. (10) 400 ; (14) 25,600 ; (20) 3,200 ; (23) 3,200 ; (32) 6,400 ; (41) 12,800 ; (45) 1,600 ; (49) 12,800 ; (62) 1,600.

II. (10) 1,600 ; (13) 25,600 ; (23) 6,400 ; (27) 3,200 ; (30) 3,200 ; (35) 12,800 ; (42) 1,600 ; (50) 6,400 ; (71) 800.

John W. D. Megaw.

TIETZ & CARLÉ: Fleckfieber-Schnellreaktion mit Trocken-diagnosticum "Krakau." [**A Rapid Typhus Reaction with the Dry Diagnostic Reagent, "Cracow."**]—*Deut. Militärarzt.* 1942. June. Vol. 7. No. 6. pp. 399–400.

A dry substance containing *Proteus OX19* is supplied in ampoules by the Cracow Institute for Typhus Research. [The method of preparation is not disclosed so that the only point in which the test is really novel remains a secret.] The ampoules are labelled "Fleckfieber- Trocken-Diagnosticum, *Proteus OX19*." Each ampoule contains enough material for 20 tests ; for use its contents are thoroughly mixed with vigorous shaking in 2 cc. of a sterile solution of saline to which an

unspecified quantity of sodium citrate has been added to prevent clotting. A drop of blood such as is used for making a thick film is placed on a glass slide and a drop of the diagnostic suspension is mixed with it. In positive reactions the bacteria form clumps and the blood corpuscles run together. If no clumping occurs within three minutes the reaction is regarded as negative. Immediate clumping is the equivalent of a Weil-Felix reaction in a titre of 1–3,200 or over ; clumping within one minute corresponds to a titre of 1–1,600 ; within two minutes to 1–800 and within three minutes to 1–400.

It is claimed that the reaction has been worked out so as to eliminate the false positives that may occur in epidemic hepatitis, enteric fevers and brucellosis. The authors themselves have encountered a considerable number of false positive Weil-Felix reactions in trench fever as well as in epidemic hepatitis.

The authors explain that they were not aware of the work on similar lines that had been carried out by HALLMANN [this *Bulletin*, 1942, Vol. 39, p. 678] till after the delivery of the lecture (25.4.42) in which they described their method.

[Killed *Proteus OX19* in suspensions in which alcohol has been added are said to keep for several months and therefore ought to be quite suitable for use in the field conditions for which the present test is claimed to be the only practicable method of diagnosis.]

John W. D. Megaw.

BARTH (Constantin). Beitrag zur Frage des Bac. Proteus X19 beim experimentellen Fleckfieber. I. Mitteilung. [**A Contribution to the Study of** *Proteus X19* **in Experimental Typhus Fever.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1942. June 1. Vol. 101. No. 6. pp. 397–404. [10 refs.]

Proteus X19 was cultivated on a medium to which the blood of a typhus patient was added ; by repeated subcultures in this medium a modified strain, called "*Proteus X19B*," was produced. A group of guineapigs were inoculated, first with cultures killed at 60°C., and then with live cultures, given by the intraperitoneal route. Ten days after the second injection the Weil-Felix test was carried out on samples of the heart blood. The animals reacted to ordinary strains of *Proteus X19* in titres of 1–100 to 1–200 and to the strains of *Proteus X19B* in titres of 1–500 to 1–1,000. Higher titres were observed in the *B* strains which had been culture-passaged 50 times than in those culture-passaged 25 times.

Guineapigs which had recovered from attacks of experimental typhus fever gave the usual negative or slightly positive reactions to ordinary strains of *Pr. X19* but they reacted in titres of 1–100 to 1–250 or more to strains of *Pr. X19B* which had been passaged 50 times. Control guineapigs were entirely negative to both strains.

Sera of persons convalescent from typhus agglutinated *Pr. X19B* in higher titres than *Pr. OX19*, *Pr. HX19* or *Pr. X19*. As in the previous experiments the *B* strains passaged 50 times reacted in higher titres than those passaged 25 times.

Guineapigs inoculated with vaccines made from cultures of *Pr. X19B* of the 25th culture-passage were not protected against virulent strains of typhus Rickettsiae, but animals inoculated with *Pr. X19B* of the 50th passage developed a considerable degree of immunity, as was

shown by the absence of significant reactions in about 77 per cent. of the animals tested, whereas all the control animals reacted in the typical way.

These findings suggest the possibility of working out a method for the protective inoculation of human beings on a large scale. It is thought that immunity, or at any rate "premunition," could be maintained without incurring the risk of introducing typhus virus into an uninfected community. *John W. D. Megaw.*

FERRO-LUZZI (Giovanni). Studio sulla malattia di Leo-Bürger in Eritrea. [**A Study of Leo Bürgher's Disease in Eritrea.**]—*Boll. d. Soc. Italiana di Med. e Igiene Trop.* (Sez. Eritrea.) Asmara. 1942. Vol. 1. No. 1. pp. 5–20. With 1 fig. English summary.

[A paper read at the first session of the Eritrean Section of the Italian Society of Tropical Medicine and Hygiene.] The paper deals with the disease variously called thromboangitis obliterans, juvenile endarteritis obliterans and Bürgher's disease. The author saw no less than 20 cases within three years in Asmara. All the patients were European males between the ages of 27 and 46: no cases were seen in the indigenous population. The course of the disease corresponded with the descriptions of cases seen in Europe, where the condition is specially common in Russia and other countries in eastern Europe. The attack begins as a thrombophlebitis nodularis migrans and eventually goes on to a condition of thrombotic occlusion of the veins and arteries of the affected parts. The clinical and pathological findings suggest an infective agency as the cause and a relationship with the vascular lesions of typhus was suspected. Accordingly the Weil-Felix test was performed in seven cases: in three the reaction was positive, up to a titre of 1–320 in two and 1–1,280 in the third.

There was no history of antecedent typhus in any of the cases. Each of the three reacting patients was given three doses of Weigl's original vaccine at weekly intervals. In two there was no reaction, but the other patient, who had reacted at a titre of 1–320, had a sharp exacerbation of his symptoms after the first dose and progressively diminishing reactions after the second and third doses. Within 15 days of the last injection the disease was arrested and apart from the permanent damage already done the patient remained free from further trouble up to the date of writing, six months later. After the third dose the Weil-Felix titre fell sharply to 1–40.

The author concluded that the disease was caused either by the virus of European typhus or, perhaps more likely, by a related virus, and that the response to treatment with Weigl's vaccine in an early case was very satisfactory. The cases in which the vaccine failed were already far advanced. Attempts to isolate the virus from the patients failed.

In the discussion following the reading of the paper Prof. DE FRANCESCO contested the author's claim to have shown that the virus was that of typhus fever, and Prof. F. PLACEO showed a patient aged 30 in whom the same disease had been completely arrested for 14 months after the subcutaneous transplantation of the ovary of a young woman.

[The point that stands out is the high degree of prevalence of the disease in relatively youthful European males in Eritrea. It would be interesting to know whether the disease is common in other tropical countries.] *John W. D. Megaw.*

MENDOZA (Lazaro). Tifus exantematico en El Salvador. Primeros casos diagnosticados y primera reacción de Weil-Felix positiva en el pais. [**Exanthematic Typhus (Probably Murine) in Salvador. The First Cases Diagnosed and the First Positive Weil-Felix Reactions in the Country.**]—*Paginas Clinicas.* 1942. pp. 93–105. Universidad de El Salvador.

In October and November 1937, four cases of typhus-like fever were seen. In one the Weil-Felix reaction was negative, in another it was fully positive in a dilution of 1–80, having been negative in the early stages of the disease. In each of the two remaining cases there was a doubtful positive reaction in a dilution of 1–200 on one occasion; this was preceded and followed by a completely negative reaction.

The cases were purely sporadic; no lice were found but two of the patients lived in rat-infested houses. The disease was regarded as having been transmitted from rats by their fleas.

John W. D. Megaw.

MENDOZA (Lazaro). Tifus exantematico en el Salvador. Caso con Weil-Felix al 1–500 con Proteus OX19, recien observado. [**Exanthematic Typhus in Salvador: A Case with Weil-Felix Reaction 1–500 with** *Proteus OX19.*]—*Paginas Clinicas.* Universidad de El Salvador. 1942. pp. 107–110.

This is an addendum to the paper reviewed above. The case occurred in the month of August and was similar in its clinical aspects to the four already described. The serum of the patient agglutinated *Proteus OX19* in a dilution of 1–500 five days after a titre of 1–100 had been observed. [In a footnote a still later case is mentioned in which the titre of the reaction was 1–1,500.]

Head lice were collected from the patient towards the end of the attack and after trituration were inoculated by the intraperitoneal route into guineapigs, whose blood was later injected into three rats, all of which died. One of the rats had an orchitic reaction. In one smear out of 25 made from the lice, Rickettsia-like bodies were found.

John W. D. Megaw.

DE MAGALHÃES (Otavio) & ROCHA (Adir). Sensibilidade do *Histiotus velatus* (I. Geoffroy) ao virus do tifo exantemático do Brasil. [**Susceptibility of** *H. velatus* **to Typhus.**]—*Brasil-Medico.* 1942. May 2. Vol. 56. No. 18. pp. 233–236.

KERGER (Hermann). Ueber verschiedene Verlaufsformen des Wolhynischen Fiebers. [**The Various Types of Wolhynian Fever (Trench Fever).**]—*Deut. Med. Woch.* 1942. Aug. 14. Vol. 68. No. 33. pp. 814–817. With 8 figs.

This, like the two recent articles by JACOBI and SYLLA [this *Bulletin*, 1942, Vol. 39, p. 758, and 1943, Vol. 40, p. 38] deals specially with the clinical features of trench fever.

More than 150 cases were observed, but no mention is made of the place of occurrence or of the epidemiological conditions in which the outbreak occurred. Great emphasis is laid on the protean nature of the disease and brief descriptions, with temperature charts of several cases, are given to illustrate this point.

The typical form of the disease, with short paroxysms of fever recurring at intervals of four to seven days, was often seen but was by no

means the predominant type. In many cases the symptoms preceded the onset of the fever by periods varying from a few days to three weeks. In this pre-febrile stage slight rises in the rectal temperature could often be detected, these tended to come in waves; the pains also tended to come and go. In other cases the fever at first was of the continued type and then became typically paroxysmal. These cases in the early stages closely resembled typhus. Sometimes the temperature curve was quite irregular.

The spleen was palpable in about 50 per cent. of the cases, but the enlargement often lasted for a few days only. The blood picture in the early stage was not helpful in differential diagnosis; later there was usually a pronounced leucocytosis during the febrile paroxysms, total counts of 20,000 or more were sometimes observed. In the non-febrile periods the leucocytes were considerably fewer. There was always a pronounced deviation to the left, with an increase in the lymphocytes and monocytes. Eosinophiles were often absent in the paroxysms, but were increased in the intervals. The pains in the early stages occurred in various parts of the body, but later they tended to be localized in the bones, especially the shin bones. In many cases the shin-bone pains were entirely absent. The nerves were usually tender on pressure, but there was no tenderness of the joints, bones or muscles; active and passive movements did not cause an increase in the pains. Altogether the character of the pains pointed strongly to the occurrence of an actual neuritis. A mild form of nephritis often occurred. Convalescence was sometimes rapid, but in many cases weakness, giddiness and loss of weight persisted for several weeks. Antineuralgic drugs were needed and convalescent serum seemed to be decidedly helpful in some cases, but no dogmatic opinion could be expressed about its value. Sulphonamides, quinine, atebrin and salvarsan were quite useless.

[The author, like the other German physicians who have had recent experience of the disease, is obviously surprised by the great variations that occur in the manifestations of trench fever. Perhaps the name "five-day fever" has been partly responsible for the mistaken impression that a regular feature of the disease is a relapsing fever with a five-day periodicity. The "shin-bone pains" also seem to have been regarded as being of almost universal occurrence. The types of the disease referred to in this paper have all been described by British observers on the western front in the war of 1914–1918.

German physicians have now ample opportunities for clearing up the doubtful points connected with the disease. A specific diagnostic test is badly needed, and the recent work on other Rickettsiae suggests that an agglutination test or a complement-fixation reaction might be very helpful in diagnosis.] *John W. D. Megaw.*

BARTONELLOSIS.

Howe (Calderón). Demostración de aglutininas para la Bartonella bacilliformes. [**Demonstration of Agglutinins for** *Bartonella bacilliformis*.]—*Actualidad Méd. Peruana.* 1942. Apr. Vol. 7. No. 12. pp. 348–356. [10 refs.]

Emulsions of *Bartonella bacilliformis* suitable for agglutination tests have not hitherto been available, but the difficulties have been

overcome by using the special culture media devised by GEIMAN [this *Bulletin*, 1941, Vol. 38, p. 695].

The sera of normal rabbits in dilutions of 1–10 gave negative reactions, but after 12 to 15 intravenous inoculations with suspensions of the organisms over periods of 50 to 60 days, responses of at least 2+ in titres of 1–160 were obtained. One animal responded 3+ in a titre of 1–640 five days after the last of 15 injections.

The sera of six persons, suffering from, or cured of, Bartonellosis were then tested. Cases 1 and 5 had pronounced verrucose lesions, cases 2 and 3 had severe attacks of Oroya fever, case 4 had recovered two months previously from a mild attack of verruga peruviana and case 6 had an attack of verruga 30 years previously, in childhood.

The reactions of the same persons were tested for agglutinins of three Proteus organisms. The responses are shown in the table. Although *B. bacilliformis* was agglutinated in low titres the reactions are regarded as significant. The reactions to the Proteus organisms are also regarded as significant, though some of them fall within normal limits and some of the persons may have had previous attacks of typhus fever.

Sera of the rabbits which were immunized against *B. bacilliformis* were consistently negative to all the Proteus strains.

Agglutination reactions of persons suffering from, or cured of, bartonellosis.

	B. bacilliformis			*Proteus OX19*			*Proteus OXK*			*Proteus OX2*		
	1/10	1/20	1/80	1/32	1/64	1/128	1/32	1/64	1/128	1/32	1/64	1/128
1. Verrucose lesions	2+	+	±	4+	3+	2+	2+	—	—	2+	+	—
2. Oroya fever	2+	2+	—	2+	+	—	—	—	—	+	+	—
3. Oroya fever	+	±	—	2+	+	—	+	—	—	+	—	—
4. Cured case (recent)	+	—	—	—	—	—	+	—	—	—	—	—
5. Verrucose lesions	2+	+	±	3+	3+	+	2+	+	—	3+	2+	+
6. Cured case (Old)	+	±	—	—	—	—	2+	—	—	—	—	—
Normal controls	—	—	—	—	—	—	—	—	—	+	—	—

John W. D. Megaw.

PLAGUE.

GIRARD (G.). Sur quelques nouveaux caractères différenciant les bacilles de la peste et de la pseudotuberculose des *Pasteurella*. [**New Characters Differentiating Plague and Pseudotuberculosis Bacilli from** *Pasteurella*.]—*Ann. Inst. Pasteur*. 1942. Sept.–Oct. Vol. 68. Nos. 9–10. pp. 476–478.

French authors have not subscribed to the identification of the organisms of plague and pseudotuberculosis with human Pasteurella, as it was put forward by LIGNIÈRES in his memoir on the haemorrhagic septicaemias. TRUCHE, DUJARDIN-BEAUMETZ and LÉVY-BRUHL have set out the characters of differentiation. In the present article Girard advances still further arguments in support of this thesis :—(1) " The bacilli of plague and pseudotuberculosis grow normally in yeast water and in potato water " which are not suited to the growth of *Pasteurella*. (2) No flocculation occurs on mixing an antiplague-filtrate serum with Pasteurella culture, and (3) " The antiplague and antipseudotuberculosis bacteriophages have no action upon Pasteurella."

W. F. Harvey.

CHOLERA.

GUINDY : REPORT OF THE KING INSTITUTE FOR THE PERIOD FROM 1ST OCTOBER 1940 TO 30TH SEPTEMBER 1941. pp. 23–27.—**Madras Cholera (Field) Enquiry** [VENKATARAMAN (K. V.)], **under the Director, King Institute, Guindy.**

Revisitation of a village in which cholera had occurred six months previously (when *V. cholerae* had been isolated from four out of 196 specimens from 61 contacts) showed, on examination of 237 specimens " from 49 members of 11 families in whom *V. cholerae* was demonstrated during the previous visit," an entirely negative result.

These researches have proved the existence of El Tor haemolytic, agglutinable vibrios in natural waters. " During October 1941, 132 specimens of water were obtained from the 33 tanks near Negapatam, which had been repeatedly examined in the previous year. Eight specimens (from eight sources) yielded agglutinable vibrios " : these were agglutinated by the Ogawa type of cholera serum. The eight sources mentioned " are different from those previously recorded positive." [See also this *Bulletin*, 1942, Vol. 39, p. 160.]

The high colour of the mannose solution made from ivory nut was got rid of " by allowing the hydrolysis to proceed at 45°C. over eight to ten days." [See this *Bulletin*, 1939, Vol. 36, p. 901.]

" Endemicity," as a term applied to a purely administrative district, evidently needs qualification. In Tanjore, for example, the seasonal incidence of cholera varies in different parts, so that cholera may disappear in one locality only to start in another. The result may, therefore, be a spurious type of endemicity due possibly only to an official conjunction of administrative areas. Naturally no district desires to be stigmatized as endemic for cholera. *W. F. Harvey.*

DENEKE (Th.). Die Hamburger Choleraepidemie 1892. [**The Hamburg Cholera Epidemic of 1892.**]—*Deut. Med. Woch.* 1942. Aug. 14. Vol. 68. No. 33. pp. 821–826. With 5 figs.

PANJA (G.), MALIK (K. S.) & PAUL (B. M.). **Examination of Cholera Vomit.**—*Indian Med. Gaz.* 1942. June. Vol. 77. No. 6. pp. 347–348.

Vomiting is common in cholera and it may be induced by giving sterile water to drink. In 52 cases the vomit was examined for the cholera vibrio, which was found in 26 cases. About 2 cc. of vomit were placed in peptone water (*p*H 9·0) for enrichment, but actually direct plating on bile salt agar was more efficacious. Both methods should be employed. The vomit *p*H was commonly 6·0 to 7·5, and isolation of the vibrio becomes more frequent at a *p*H above 6·0. No positive isolation was obtained when the *p*H was below 5·0. "The amount of sodium chloride present in the vomitus varied from 66 to 821 mg. per 100 ccm. and bore no relation to the hydrogen-ion concentration." *W. F. Harvey.*

CO TUI & WRIGHT (A. M.). **The Preparations of Nonpyrogenic Infusion and Other Intravenous Fluids by Adsorptive Filtration. Report of 42 Months' Trial.**—*Ann. Surgery.* 1942. Sept. Vol. 116. No. 3. pp. 412–425. With 4 figs. [16 refs.]

The dangerous febrile reaction which may be produced by simple saline injection was pointed out in 1911 by HORT and PENFOLD and has become more and more important with the increasing adoption of blood transfusion. Bacterial growth appears to be the basis for the formation of "pyrogen" not only in the solvent but even in "dry," "commercially pure" chemicals. Among aerial contaminants *Proteus vulgaris* and *B. subtilis* have been incriminated as "fairly prolific pyrogen producers." Every endeavour is now made to render intravenous infusion fluids pyrogen-free. This has been effected by filtration through "specially prepared compressed asbestos pads" which act by adsorption of the offending pyrogen. The method is efficacious for the filtration of crystalloids such as sodium chloride, dextrose and sodium citrate, but is ineffective for colloidal substances such as sera, gum acacia, etc. Many practical difficulties have had to be overcome in getting the present asbestos pads and, incidentally, in establishing a standard of pyrogenicity. Most of the filtration difficulty has been surmounted by special attention to the composition of the filter pads and by "interposing an aloxite fibre eliminator between the asbestos filter and the collecting bottle." The pads are calibrated with regard to: (*a*) the speed of filtration and (*b*) degree of pyrogen retentiveness. Standardization of pyrogenicity has necessarily been biological, for which a standard sample of "pyrogen" was necessary. That which the authors have adopted, and which is described by them as still of crude composition, is "isolated from the cell-free Berkefeld filtrate of the supernatant portion of concentrated stock suspension of typhoid vaccine (1 cc.=88 billion cells). From seven litres of this suspension four grams of substance was yielded." It is called "pyrogen-A" and the minimum effective dose (M.E.D.) is "arbitrarily defined as that dose per kilo body weight which on intravenous injection will cause a temperature rise of 0·8° to 1·0°F." The M.E.D. is 0·1 *gamma* in rabbits, 0·4 *gamma* in dogs and 0·03 *gamma*

in man. Asbestos pads are calibrated by filtering "pyrogen A" through test pads and titrating the filtrate in both rabbits and dogs. The entire filter assembly is figured in this work. Results of the administration of intravenous fluids, rendered non-pyrogenic by the filtration apparatus, have been entirely satisfactory. The total administration was 3,867 litres over 42 months of trial on patients. "In none of these was there a reaction . . . . The irreducible equipment costs about 1,000 dollars. If the cost of the flasks for initial use is set at 600 dollars and to this is added part-time labor of 50 dollars a month, which can be expanded into full-time labor as the need arises, the total may be set at 2,200 dollars."

W. F. Harvey.

BACILLARY DYSENTERY.

MOGILNIZKY (B. N.) & BRUMSTEIN (M. S.). **Contribution to the Pathology and Morbid Anatomy of Dysentery.**—*Arch. Sci. Biol.* 1941. Vol. 62. No. 3. [In Russian pp. 76–84. With 13 figs. (12 refs.) English summary p. 85.]

"1. Dysentery is an affection of general toxicity.

"2. Apart from the characteristic changes in the intestine, the dysentery toxin disturbs the function of the barriers of the organism and alters the permeability of the capillary walls, thereby eliciting degenerative and inflammatory phenomena in the parenchymatous organs, the central and vegetative nervous system.

"3. The intensity of this effect depends as follows:

"*a*. On the virulence of the bacteria (according to our observations, the Shiga-Kruse strain, or the infections mixed with it are most toxic);

"*b*. On the state of the organism—the resistance of its active connective tissue (histiocytes, Hortega's cells, reticulo-endothelium, etc.).

"4. The disturbance of the permeability of the capillary walls is accompanied by the appearance in the pericapillary spaces of a fluid abundant in protein, and hence diminishes the oxygen supply of the tissues (anoxia), the consumption of nutrient substances and the excretion of waste products. Along with its direct effect the toxin favours the initiation of grave lesions of the liver, of serous glomerulitis, and of serous edema of the myocardium with a degenerative change of the cardiac muscle.

"5. The changes in the vegetative and central nervous system vary greatly, according to the toxicity of the bacteria, the state of the patient and the barrier reactions of the organism.

"6. Most intense are the changes in the large intestine as well as in the small intestine when this is involved in the inflammatory process. Somewhat less affected is the solar plexus and rather slight changes occur in the ganglia and intramural apparatus of the heart.

"7. While the ganglionic cells and fibres of the small intestine, stomach and oesophagus show no changes, there usually occur proliferative processes in the histiocytes, Schwann cells and satellites which we consider as barrier reactions against the toxins circulating in the blood.

"8. One may frequently note no pathological phenomena even in the plexuses of the large intestine, or along the affected neurones—a great number of unchanged cells and fibres surrounded by proliferating histiocytes, Schwann elements and satellites.

"9. These diverse microscopic pictures are apparently linked with the variations of the reactions and are a matter of controversy among the neurohistologists.

"10. In the cerebrum and spinal cord there were noted, in some cases, destructive changes of the ganglionic cells (cortex, nuclei of the mid-brain, medulla oblongata and spinal cord).

"11. It may be assumed from the above data that in dysentery we are dealing . . . with toxic shock phenomena associated with disturbances in the barrier reactions of the organism and subsequent affection of the parenchymatous elements of the central as well as vegetative nervous system.

"12. This suggestion emphasizes the rôle of the active connective tissue in dysentery, as the problem is of great practical significance as regards the application of curative factors (non-specific and specific stimuli)."

LYON (George M.). **The Chemotherapy of Bacillary Dysentery. Further Observations on Sulfaguanidine.**—*U. S. Nav. Med. Bull.* 1942. July. Vol. 40. No. 3. pp. 601–608.

More than 300 patients were treated with sulphaguanidine. With few exceptions the method of administration was that originally recommended by MARSHALL. The initial dose was 0·1 gm. per kilo. the maintenance dose 0·05 gm. per kilo. every four hours till the stools were less than 5 in 24 hours, and then 0·05 gm. per kilo. every 8 hours for 48–72 hours. The urinary output must be maintained.

The favourable impressions previously recorded were confirmed, and when treatment was commenced during the first five days recovery usually occurred in 2–5 days. In the majority of cases five days of chemotherapy were sufficient. When so used sulphaguanidine was free from toxic effects. The importance of early treatment cannot be over-emphasized. But when there was blood and pus in the stools, even though treatment was not commenced early, results were nearly as satisfactory.

In the "post-infection intestinal indigestion," with greenish watery stools, sulphaguanidine had the least satisfactory results. Intestinal indigestion was formerly very common among infants and young children and is still not infrequent in dysentery patients not receiving chemotherapy.

The best results with sulphaguanidine were obtained in those patients treated at the earliest moment after onset, and who were passing blood and pus ; it was least effective in those in whom chemotherapy was not commenced till the bacterial invasion was over. Sulphaguanidine appears to be equally effective against all dysentery bacilli. Most of the toxic effects which have been observed with other sulphonamides have occurred with sulphaguanidine, when given in larger doses than recommended and when due attention is not given to the character of the stools. Except in new-born children no deaths have occurred among patients treated with sulphaguanidine, provided that treatment was commenced during the first five days of illness, but parenteral infections, whether due to influenza virus or

pathogenic bacteria, exerted a detrimental effect. Those patients who were promptly treated showed surprisingly little disturbance of digestion either during the period of active therapy or after recovery.

In spite of this it was deemed advisable to employ a bland diet, materially restricted in amount, during the period of active treatment. Relapses early or delayed were extremely rare after sulphaguanidine treatment.

Succinyl sulphathiazole was employed in 14 patients. The maintenance dose was 0·04 gm. per kilo. every four hours, with an initial dose of twice that amount. The results appeared to be as favourable as sulphaguanidine and there was entire freedom from untoward effects.

P. Manson-Bahr.

Bibikova (T. I.). **Treatment of Dysentery with Methylene Blue.**—*Arch. Sci. Biol.* 1941. Vol. 62. No. 3. [In Russian pp. 99–102. With 1 fig. English summary p. 103.]

"1. Treatment of dysentery by intravenous injection of methylene blue is undoubtedly effective with regard to the forms of the disease caused by Bac. Hiss-Flexner.

"*a.* In a great percent. of cases, particularly in medium-grave forms, it aborts the disease.

"*b.* In grave cases it produces a definite change towards amelioration of pathogenesis where the disease has not been aborted. Moreover it improves subjectively the state of the patient in soothing the pains and tenesmus.

"2. The injection of methylene blue does not produce a clinical effect in grave forms of dysentery caused by Bac. Shigae.

"3. Methylene blue should be regarded as a non-specific factor which alters the reactivity of the organism."

Siedek (Hans). Ueber Dünndarmfunktionsstörungen nach Ruhr und ihre Behandlung. [**Disturbance of Small Intestine Function after Dysentery : Treatment.**]—*Wien. Klin. Woch.* 1942. Aug. 21. Vol. 55. No. 34. pp. 666–669. [10 refs.]

This paper is based upon observations made in a military convalescent establishment. The author was impressed by the fact that a small proportion of bacillary dysentery convalescents, in whom healing of the intestinal mucosa was protracted, and who continued to suffer from digestive disturbances, as is so often the case, showed definite evidences of defective fat absorption due to catarrh of the small intestine ; this was especially the case in those who developed rheumatic symptoms due to dysenteric intoxication. There were also subjects who developed icterus, who some time previously had suffered from bacillary dysentery ; these also, as a rule, showed very distinct evidences of prolonged disturbance of fat absorption. In this instance, also, the origin of the jaundice appears to be small-intestine catarrh.

There is no evidence that these sequelae of dysentery are to be regarded as allergic in nature. In the treatment of this absorptive defect nicotamide (Nicobion) had an immediate and striking effect. Pancreatic preparations are especially helpful in cases with hypochlorhydria. But in vagotonic cases with fat absorption defects improvement is much more difficult to effect. Campolon injections

and tannalbin were also tried, but no favourable conclusions were reached. The former appeared to affect the condition of the stool in one instance only. With nicotamide, on the other hand, improvement in the stools as well as in the general condition of the patient was evident. *P. Manson-Bahr.*

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS.

WESTPHAL (Albert). Experimentelle Amöbenruhr beim Kaninchen. [**Experimental Amoebic Dysentery in the Rabbit.**]—*Deut. Trop. Ztschr.* 1941. Nov. 1. Vol. 45. No. 21. pp. 653–657. With 2 figs.

Attempts by many observers to infect rabbits with *Entamoeba histolytica* have failed because, in the author's opinion, the contents of the intestine are unsuitable for the establishment of this amoeba. He has noted previously that if the contents of the caecum are altered by feeding the animals on a corn and bread diet in place of the usual green food it is possible to produce an infection with *Balantidium coli* which establishes itself in the caecum. By the same means the author attempted to produce infection with *E. histolytica*. After a number of trials one animal to which cysts had been administered acquired an ulceration of the caecum in which numerous amoebae occurred. It is claimed that the character of the lesions showed that, as in kittens, the amoebic invasion was secondary to a previous bacterial damage to the mucosa. *C. M. Wenyon.*

COUTTS (Waldemar E.) & HERRERA (Juan Martini). Amebiasis urinaria. Comunicación de un caso de infección pielo-caliciaria producida por Entamoeba hystolitica. [**Urinary Amoebiasis due to** *E. histolytica.*]—*Med. Moderna.* Valparaiso. 1942. Feb. Vol. 15. No. 7. pp. 327–329.

The case reported is one of nephritis in which the turbid urine contained large numbers of red blood corpuscles, pus and epithelial cells. In addition the urine contained amoebae which, from their movement, nuclear structure and included red blood corpuscles, were identified as *Entamoeba histolytica*. At a later examination in hospital a large number of amoebae were seen in the urine. There was cardiac hypertrophy and bilateral retinitis. In the absence of evidence of cystitis a diagnosis of amoebic pyelitis with glomerular nephritis was made. Considerable improvement in the suppurative condition followed administration of emetine. *C. M. Wenyon.*

CAMERON (J. A. M.) & COLLINS (J. C.). **Intestinal Obstruction by Amoebic Granulomata.**—*Jl. Roy. Army Med. Corps.* 1942. Sept. Vol. 79. No. 3. pp. 140–142. With 1 chart.

[" An hypertrophic type of amoebic disease . . . is not usually thought of in making a differential diagnosis . . . of large bowel tumours" (the "large" qualifies "bowel" not "tumours"). If more cases like the present were as carefully recorded as this, medical officers, at all events those with tropical experience, would at once bear in mind

" amoeboma " or amoebic granuloma as a possibility and not think only of malignant disease, syphilis, tuberculosis and polyp under like conditions.]

A man of 27 years gave a history of abdominal pains for the preceding 48 hours, worse in the last 24 hours, and accompanied by vomiting; signs pointing to intestinal obstruction were present (but the pulse remained normal and the vomiting ceased). A tender annular swelling was felt an inch above the anal sphincter and a mass in the recto-vesical pouch. Laparotomy was performed and in the rectal ampulla was a mass " the size of a non-gravid uterus " and another the size of a tennis ball in the transverse colon to the right of the midline, where clinical examination had revealed acute tenderness. Caecostomy was performed. During the next 16 days there was intermittent fever up to 101°F, and leucocytes numbered 14,000 or more per cmm., with a relative polymorphonucleosis. " Repeated stool examinations were negative for ova, parasites and cysts." [This is unusual in these cases.] The fact of involvement of the parietes, as a fungating mass, afforded the clue to its amoebic nature [no mention is made of histological examination of this or the bowel tumour]. Emetine was prescribed, although no entamoebae had been seen and after three grains had been taken the temperature became normal, but the course of 12 grains was completed and followed by 0·25 gm. carbarsone twice daily for a month. The wound cleaned and healed in a month after the emetine was started and recovery was uneventful and complete.

H. Harold Scott.

Niño (Flavio L.). Tumores inflamatorios amibianos del intestino grueso. (Contribución a su estudio. [**Amoebic Tumours of the Large Intestine.**]—*Bol. Inst. Clín. Quirúrg.* Buenos Aires. 1942. May. Vol. 18. No. 145. pp. 153–213. With 7 plates, 7 charts and 28 figs. [31 refs.] English summary.

This is a professorial thesis and constitutes an able review of the subject of amoebic tumours of the caecum and colon, illustrated by five cases. The author treats the question in six sections and one of general conclusions and bibliography. The first gives a brief account of the history of the condition, starting with a quotation of the case of Ricaldoni and Berta (published in 1916) in which a hard painful swelling the size of a fist was found in the right iliac fossa and was diagnosed as " hypertrophic tuberculosis of the caecum." The caecum, ascending and part of the transverse colon were removed and histological examination showed that the swelling was due, not to tuberculosis, but to *E. histolytica*. Other cases, recorded down to 1937, are referred to. In section II the author discusses the name of the amoeba and concludes that it ought to be known as *Entamoeba dysenteriae*, Councilman and Lafleur 1893. Next follows a chapter on the pathological anatomy and histology, with good illustrations and a coloured plate showing the lesions. The symptomatology and diagnosis are then discussed, the latter depending on the history and the course of the disease, the results of sigmoidoscopy and examination of the faeces. The therapeutic test is confirmatory. After a brief section on prognosis and treatment the author's five cases are detailed and X-ray findings and photomicrographs of the tissue changes are reproduced. [The whole is a good account of a subject which, it is true, is described in the text-books, but which is likely to escape notice on account of its comparative rarity.]

H. Harold Scott.

BERNE (C. J.). **Diagnosis and Treatment of Amebic Liver Abscess.** —*Surgery, Gynecol. & Obstet.* 1942. Aug. Vol. 75. No. 2. pp. 235–238.

That many surgeons in America tend to regard amoebic infection of the liver as a purely surgical manifestation became apparent when it was found that the case mortality from the disease at the Los Angeles County Hospital in 1931 was 85 per cent. Amoebic abscess must be regarded, not as some rare exotic, but as an ever-present possibility in that area. Since that date 74 cases of amoebic abscess have been recognized. Amoebic infection of the colon always antedates liver abscess, but many cases of amoebic colitis are clinically silent. Of the author's patients, 30 gave a history of diarrhoea, 44 had none, 6 were constipated.

Gross ulceration of the colon was present in 14 out of 24 in which autopsy was performed and in five there had been no diarrhoea. The surgeon may therefore be forced to diagnose amoebic hepatic abscess in the absence of any signs of the primary disease. In 55 cases in which faeces were examined trophozoites or cysts were found in 40. There were only five women and no patient was under 20 years of age. Alcoholism was not a factor, but a seemingly important relationship does exist between trauma and amoebic abscess. This aspect has medico-legal significance. Ten cases were not recognized before autopsy and the condition was probably responsible for death in an equal number of cases which did not come to autopsy. This diagnostic difficulty in Southern California may be ascribed to the fact that amoebic hepatic abscess presents many manifestations not usually described in text-books. Instead of being chronic in 58 per cent., the process was an acute severe disease. In 33 per cent. abdominal features were absent, or minimal, and the clinical phenomena were pulmonary.

Four syndromes are recognized: acute and chronic costal, acute and chronic pulmonary. The chronic costal type includes classical cases misdiagnosed as carcinoma of liver, stomach, gall bladder or colon, amyloid disease, Echinococcus or pancreatic cyst or *hepar lobatum.* The acute costal type is usually mistaken for acute cholecystitis, penetrating or perforated duodenal ulcer, or abscess complicating peptic ulcer or cholecystitis. The chronic pulmonary type closely resembles cancer of the lower lobe. In the acute pulmonary form "basal pneumonia" is repeatedly diagnosed, as is empyema when effusion occurs. In such cases a bronchial fistula may result.

If the left lobe of the liver is involved the process may be acute or chronic and the phenomena occur in the epigastrium rather than at the left costal margin.

The primary basis for cure of amoebic abscess is emetine in sufficient dosage. Amoebic abscess is a special type of liver necrosis, and emetine is as much a specific as neoarsphenamine is for a gumma. Two factors tend to confuse the situation: first, the gross resemblance to bacterial infection; second, timidity in administering adequate amounts of emetine.

In a third of the series the abscess content was not anchovy-sauce pus, but was creamy white puriform material; in a number of instances it had a foul odour. Except in three cases in which extensive lung and diaphragm destruction existed, every abscess was sterile.

Hesitation in giving adequate emetine is based upon fear of the capacity of the drug to injure the myocardium. As a result many patients with amoebic abscess have retained excellent hearts, but have died of insufficiently treated amoebic abscess. Emetine was given in 1 grain doses daily, intravenously or intramuscularly for six doses, then a rest for six days. As much as 24 grains have been given and not one cardiac problem has developed.

Electrocardiography, in conjunction with observation on blood pressure, is of great help in controlling therapy.

Cases treated with emetine only: 19 patients were treated, with complete recovery in all. The largest dose was 16 grains—average 9½ grains. The drug was administered intravenously in 10 and intramuscularly in nine. In this group were four cases in which aspiration yielded nothing. An aid in measuring inactivation of the infection is the blood sedimentation rate, which has constituted an important guide in indicating need for further treatment.

Cases treated with emetine and aspiration: A group in which, after emetine therapy, the response is not satisfactory, or a mass exists; aspiration then becomes necessary and may require repetition. For this procedure a cerebral ventricle needle forms an excellent instrument. Believing that dome abscesses are repeatedly missed by the customary procedure, the author prefers to aspirate high along the right costal margin, upwards, outwards and backwards. By this method 18 cases were treated, with no deaths. Three required three aspirations each; the largest amount extracted at one time was 2,200 cc., the smallest 45 cc.

The surgically treated series comprised 26 cases, 14 adequately treated with emetine. The mortality was 53 per cent., but clinically this group was not very comparable with the preceding groups. In four there was acute intraperitoneal rupture. One death was due to open drainage with resultant post-operative bacterial infection of the liver.

P. Manson-Bahr.

WESTPHAL (Albert). Ein Kulturverfahren für *Entamoeba gingivalis* und dessen Anwendung für die Differentialdiagnose von *E. gingivalis* und *E. histolytica*. [**Culture Method for** *E. gingivalis* **and for its Differentiation from** *E. histolytica*.]—*Deut. Trop. Ztschr.* 1941. Nov. 15. Vol. 45. No. 22. pp. 685–690. With 18 figs.

The author describes the cultivation of *Entamoeba gingivalis* in a medium consisting of a special serum Ringer's solution over a solid serum agar slope. In this medium, by subculturing every second day, it is possible to maintain a strain indefinitely. The medium is useful for diagnostic purposes, as the amoeba was isolated in it from 73 per cent. of apparently normal mouths. In the fresh condition *E. gingivalis* resembles *E. histolytica*, but it tends to move in one direction more so than does *E. histolytica*. When fixed with sublimate alcohol *E. gingivalis* retains its amoeboid form, with its ectoplasmic pseudopodia, while *E. histolytica* shows a greater tendency to become rounded.

C. M. Wenyon.

RISSMANN (E. F.). Ueber die Lambliasis intestinalis im Generalgouvernement. [**Intestinal Giardiasis in S. Poland.**]—*Med. Klin.* 1942. June 5. Vol. 38. No. 23. pp. 532–534.

During the two years period 1939–1941 in the hospital in Cracow 26 cases of Giardia infection were diagnosed by the discovery of the

flagellate in material obtained by duodenal tubage. The incidence of this infection is not high, for in 1941 alone the operation was carried out on 686 cases. The author is convinced that Giardia is responsible for the symptoms in the cases in which it was found and that these are mainly of three types—gastro-intestinal, cholangitic and cachectic. Atebrin treatment has given uniformly good results.

C. M. Wenyon.

HEADLEE (William Hugh). **Intestinal Parasite Infections among In-Patients of the Indiana University Medical Center Hospitals.**—*Amer. Jl. Trop. Med.* 1942. July. Vol. 22. No. 4. pp. 341–350. With 1 map. [20 refs.]

An examination of 258 patients revealed the following infections and percentages: *Entamoeba histolytica*, 0·8; *Entamoeba coli*, 25·6; *Endolimax nana*, 12·4; *Iodamoeba bütschlii*, 0·8; *Giardia intestinalis* 9·7; *Chilomastix mesnili*, 0·8; *Trichomonas hominis*, 1·2; *Ascaris lumbricoides*, 0·8; *Trichuris trichiura*, 0·8; *Necator americanus*, 0·4; *Enterobius vermicularis*, 5·0; *Hymenolepis nana*, 0·4. Of the patients examined, 37·6 per cent. showed infection with one or more of the above parasites. The final conclusion is that the data presented add to our knowledge of the incidence and distribution of human intestinal parasite infections in Indiana, which are of sufficient importance to warrant more than a casual interest on the part of the clinician.

C. M. Wenyon.

HEADLEE (William Hugh) & CABLE (Raymond M.). **Intestinal Parasitism among Students of Berea College, Kentucky.**—*Amer. Jl. Trop. Med.* 1942. July. Vol. 22. No. 4. pp. 351–360. [29 refs.]

The infections recorded in this paper are based on the examination of 2,393 individuals, 69·9 per cent. of whom were in the age group 16–20 years. The parasites and percentages found are as follows: *Entamoeba histolytica*, 5·0; *Entamoeba coli*, 50·2; *Endolimax nana*, 42·3; *Iodamoeba bütschlii*, 11·3; *Giardia intestinalis*, 5·7; *Chilomastix mesnili*, 1·0; *Trichomonas hominis*, 0·04; *Ascaris lumbricoides*, 5·1; *Trichuris trichiura*, 7·9; *Necator americanus*, 14·6; *Strongyloides stercoralis*, 3·8; *Enterobius vermicularis*, 0·4; *Hymenolepis nana*, 2·5. Of the total number of individuals examined 75·5 per cent. harboured one or more of the above parasites. *C. M. Wenyon.*

YAWS.

MASSE (G.). La dermatose nodulaire et ulcéreuse de l'Ubangi et ses rapports avec le pian. [**Nodular and Ulcerative Dermatitis in Ubangi: Relationship to Yaws.**]—*Ann. Soc. Belge de Méd. Trop.* 1940. Sept. 30. Vol. 20. No. 3. pp. 287–295. With 16 figs. on 7 plates.

The author describes the well known gummatous nodules and ulceration of the skin so prevalent where yaws is pandemic. He confirms the generally accepted view that tertiary yaws (and more rarely syphilis) is responsible and that other names are redundant. He thinks that

trauma plays a part, quoting greater frequency observed in the right arm and lower limbs. Dr. PICARD of the Cancer Institute of Louvain found endarteritis obliterans in one nodule, and calls it the signature of syphilis. There was no evidence that the patient had been syphilitic, but he certainly had had yaws. *C. C. Chesterman.*

LEPROSY.

DENECKE (Karl). Ergebnisse eines statistischen Querschnittes einer westafrikanischen Leproserie und Untersuchungen der Leprösen, deren Verwandten und Kinder. [**Statistics of a West African Leprosarium.**]—*Arch. f. Hyg. u. Bact.* 1942. Vol. 128. No. 2. pp. 102–111. [11 refs.]

The author reports on a study of leprosy in the Spanish West African Colony of Rio Muni immediately to the south of the Cameroons. The disease is widespread in this moist, hot forest-clad area among the indigenous people, especially in the island of Fernando Po. Two leprosaria near the Cameroon border accommodate a number of cases under a Government doctor; in one of these the present inquiry was made. Employment in brickworks and on agriculture is supplied. The author examined 104 cases and found the highest incidence among men of 30–39 and women of 20–29. He discusses the subject of hereditary transmission in the light of data regarding the number of the children, one or both of whose parents were lepers, who developed the disease, and of other infected relatives. The average number of children in families in which leprosy was present was five, and of these the average number of infected was only 1¼, but in twelve families in which one or both parents were lepers, the proportion of infected children was 1·4, or nearly the same figure; he concludes that all the known data are against hereditary transmission. The author regards infection through wounds as the most common form and considers the incubation period to be long. Unfavourable diet predisposes to infection and the indigenous diet consists chiefly of carbohydrate with very little animal protein. Yams are extensively consumed, but in a reference to the recent suggestion that their consumption predisposes to leprosy he points out that the healthy eat them as much as the infected. He next discusses the marriage of lepers and records that 75 lepers with leper wives had only 27 children, but 72 with healthy women partners had 164 children, so that the greater part of the leper couples, namely 56 out of 75, were sterile, against only 25 out of 72 when one partner only was a leper. Both classes had an equally high child mortality. Miscarriages were comparatively few.

Clinically only nine cases were of the nodular or lepromatous type, so the nerve form predominated. Lepra bacilli were found in the nasal discharge in 18 per cent., in the blood in thick smears in 20 per cent., and in the skin in 24 per cent. Under local treatment is described a native method of cauterizing skin lesions with charcoal or rubbing them with sandpaper; pigmentation may result. Oil of the gorli seed from the forests is also used locally as a salve. Sodium-caloncobate made from the gorli seed, is also used intravenously as well as *Hydnocarpus wightiana* preparations. A large number of the

patients suffer from malarial and filarial infections, and in only 11 of 103 examinations were the ova of worms not found in the stools. Sleeping sickness is a not uncommon complication. *L. Rogers.*

ROSSAS (Thomaz Pompeu). A lepra no Maranhão. [**Leprosy in Maranhão.**]—*Arquivos de Higiene.* Rio de Janeiro. 1941. Dec. Vol. 11. No. 2. pp. 27–51. [12 refs.] English summary.

In the decade 1922–32 there were 995 registered lepers in Maranhão 662 males and 333 females. When a census was taken in 1939–41 there were 176 old cases and 1,035 new ; of these 895 were discovered in a medical survey, 114 were in the leprosarium or Capital Dispensary, and 26 at the Health Department posts. Medical men at their survey examined 64,191 persons, 5·8 per cent. only of the total population (1,105,788). Tables are given showing the sex distribution of the total ; of these 836 (69 per cent.) were males, 375 (30·9 per cent.) females ; 287 were of the lepromatous type, 615 the nervous and 214 mixed ; 501 were infective and 710 were burnt out cases. Other tables give the incidence in different parts of the municipality, the clinical types in each department and the numbers of infective cases. As regards incidence, the greatest number, 208, were in São Luiz among a population of 84,353, a rate of 2·4 per mille ; the highest rate was in Anajatuba, where there were 79 lepers in a population of 13,729, or 5·7 per mille ; the second largest number was found in Caxias, 84 among 67,358, which, however, gives an incidence of only 1·2 per mille. Factors favouring the high incidence are that lepers mix freely with the general population, many of the people are very poor and live in dark, damp, thatched huts, they are ill-nourished and in their debilitated state fall ready victims to disease and there is little or no attempt at efficient prophylaxis by removal of these drawbacks, though there is a leprosarium of the colony type at Bonfim on the shore of the island of São Luiz. This was started in 1932 and opened in 1937. In 1938 there were 152 inmates and 18 deaths ; in 1939, 163 patients, 9 deaths ; in 1940, 194 (18 died). At the end of May 1941, inmates numbered 183. At the São Luiz dispensary in 1940 45 new cases received treatment and 31 were sent to the leprosarium.

H. Harold Scott.

DUBOIS (A.) & GAVRILOV (W.). Essais d'inoculation de la lèpre humaine au hamster non splénectomisé. [**Inoculation of Hamsters with Human Leprosy.**]—*Ann. Soc. Belge de Méd. Trop.* 1941. Sept. 30. Vol. 21. No. 3. pp. 189–194.

The authors report on 16 negative results from the inoculation of hamsters with human leprous material, obtained, in 12 cases, from the Congo by air in nine days, and with fresh material in the other four, and without previous removal of the hamsters' spleens. Ten of the animals lived for six months and over, but the results were negative with the exception of one animal which developed extensive lesions containing acid-fast bacilli, but the organism proved to be Stéfansky's bacillus of rat leprosy. This they are unable to explain but are investigating the matter further. They conclude that, although these results do not invalidate occasional positive results by previous workers, they do prove that such infections are far from being of regular occurrence.

L. Rogers.

Muñoz Rivas (Guillermo). Algunas observaciones relacionadas con las pulgas y la transmision de la lepra. (Notas preliminares.) [**Fleas and the Transmission of Leprosy.**]—*Rev. Facul. de Med.* Bogota. 1942. Apr. Vol. 10. No. 10. 47 pp. With 9 figs. [48 refs.]

[So long as the mode of transmission of *Myco. leprae* is unknown it is as well to try out all possibilities. The reasons for suspecting fleas are slender, namely : (1) That the flea is universal ; (2) That warm and moist countries are the homes of leprosy and also favour fleas ; (3) That they flourish in rooms, clothes and among leper associates ; (4) That they may contaminate themselves in the larval or imago stages ; (5) That their length of life affords abundant chances of reinoculation.]

The author set himself to examine first for acid-fast bacilli in the stomach contents of fleas caught in the Leper Dispensary at Cundinamarca. Among 200 *Pulex irritans* captured 32 contained these organisms which, moreover, could not be cultivated on Löwenstein's medium. Of another 30 allowed to feed on lepers 20 were positive at intervals between ½ and 48 hours ; on the other hand, none of 53 controls had any such organisms in their stomach contents. The same result was obtained in 50 *C. canis*, whereas of 14 allowed to bite lepers seven were positive, one up to four hours and six to 48 hours.

He next examined the larvae ; all of 20 *P. irritans* larvae and of 54 *C. canis* larvae fed on infective material were positive, none of 41 of the former and 73 of the latter which were examined as controls. He observed that the bacilli in the positive larvae broke down to acid-fast granules. Of six nymphs of highly infected *C. canis* one was positive and two out of three of those of *P. irritans*. Of 47 larvae of these two species of flea which were caught in the dust of the dispensary 31 were positive, but only one of 12 nymphs ; one adult *P. irritans* (the only one examined) was positive, but none of 10 *C. canis* [it is misleading to call this 9 per cent. infection of *C. canis* and *P. irritans*].

In the last section of this article the author discusses the possibilities of other insect vectors, lice (a few examined were negative) ; Simuliidae (too short a life), mosquitoes, Triatoma and Rhodnius (absent from many places where leprosy exists), Cimicidae (organisms found by some authors, but leprosy exists where these cannot be found), ticks (several examined with negative results and, again, leprosy is present in places where there are no ticks), Musca and *Tunga penetrans* (no evidence in favour of the former except mechanical transmission to a wound possible ; of the latter the author has had no experience). [The remarks in brackets are the author's reasons for ruling the insects out.] *H. Harold Scott.*

Cochrane (R. G.). **Prognosis and Treatment of Leprosy with Special Reference to its Pathology.**—Reprinted from *Jl. Christian Med. Assoc. India, Burma & Ceylon.* 1942. May. 9 pp. With 13 figs. on 6 plates.

The author stresses the difficulty in correct prognosis and treatment without having clear ideas on the pathology of leprosy ; progress during the last five years has greatly increased the accuracy of prognosis. Most adults have a great resistance to leprosy, and there is a strong tendency for the mildest nerve forms to recover spontaneously ; it is therefore important to be able to recognize the more serious types

in order to foretell their future course. A table of the proportion of improvement without treatment in the author's Madras clinic in the different types showed 43·5 per cent. in simple macular (neural), 60·4 per cent. in tuberculoid macular (neural) minor, 75 per cent. in tuberculoid major, and 27·8 per cent. in the incipient lesions of childhood described by the author; making 53·1 per cent. of the total 228 cases. Improvements were three to five times as frequent in cases giving a positive lepromin reaction as in negative cases. Neural cases very rarely become lepromatous, but five of 23 incipient ones did so.

The cellular reactions in the lesions of the different types are next dealt with, and the strong cellular resistance of the nerve types, illustrated by the tuberculoid and tissue reactions leading to destruction of lepra bacilli, is emphasized. The absence of such resisting power, which enables the infective organism to multiply enormously and become distributed throughout the body by the blood stream, makes the lepromatous variety much more serious. In the case of infection of the nerve trunks the tuberculoid cellular multiplication may even form abscesses within the nerve sheaths and so damage the nerve fibres as to result in permanent destructive lesions. The vital organs, however, are not attacked even in the lepromatous cases. Tables are given of the well established points of differentiation of the various types, together with microphotographs illustrating the pathology, and photographs of a few clinical cases before and after treatment; this was on the usual lines by means of the hydnocarpus preparations, especially esters given intradermally. *L. Rogers.*

REENSTIERNA (John). **Further Therapeutic Tests with an Anti-Leprosy Serum (in Netherlands East Indies and Other Countries).**—*Acta. Med. Scandinavica.* 1941. Supplement 118. 195 pp. With 17 plates.

Professor Reenstierna has been working enthusiastically for years on the value of a serum he has prepared by the repeated injections of sheep with an acid-fast bacillus, cultivated by him from the blood of a leprous patient and similar to that of Kedrowski; this bacillus is regarded by the author as the causative organism of leprosy. Although few leprologists at the present time would accept that opinion, this does not affect the evaluation of his serum in leprosy. All the cases treated since Professor Reenstierna's report in the *International Journal of Leprosy*, Vol. 6, early in 1938, are included in the present volume and relate to seventeen countries, from some of which only brief accounts in letters or cables are available. It may be recalled that the course advised is three doses of 10 cc. each intragluteally, in the course of three months. [See also this *Bulletin*, 1938, Vol. 35, p. 299.]

In attempting to form an opinion on the value of the voluminous further evidence recorded in this volume, the very modest claims of the author must be borne in mind. He considers fully developed lepromatous cases to be unsuitable for his treatment. On the other hand, photographs and illustrations are recorded to show improvement in the muscular power of the fingers and hands and of the facial muscles, and return of sensation. Further, the healing of nasal ulcers, as well as those of the extremities, and improvement, in the blood sedimentation rate and of the sight are recorded in some cases, although in the

last, only the patients' impressions are mentioned. He also emphasizes that in a large proportion of the cases the serum was used only after the failure of prolonged treatment with chaulmoogra preparations, which, when possible, are omitted for a month before the serum is tried. In his paper of 1938, referred to above, he concludes that his serum "should become a good auxiliary to the standard therapy with chaulmoogra," but he does not advise their being used at the same time because chaulmoogra oil seems to interfere in some way with the action of the serum. Unfortunately no analysis of the most important features of the cases has been made by the author, so the reviewer has tabulated those of the 107 cases in which detailed information of the conditions before and after treatment are recorded, in order to allow a reliable estimate of the evidence to be given.

The first noteworthy feature is the considerable duration of the symptoms at the time of treatment in a large proportion of the cases. Only five appear to have been of less than one year's duration and four more of under two years, but nearly half were of five to fifteen years' duration. Nearly 40 per cent. were lepromatous or predominantly lepromatous cases in which the author would not expect improvement except in any accompanying nerve symptoms. Unfortunately, largely owing to the handicap of the war and to the short time the author was able to spend on visits to particular leper institutions to which he supplied his serum, in the great majority of the cases the progress reports were made only a short time after the treatment was commenced, and frequently before the full course had been carried out. In these cases only the immediate results following use of the serum are recorded so it will tend to clarity if these are first considered.

It is unfortunate that the detailed reports of eight cases treated by Ryrie in Malaya were made only six days or less after the commencement of the treatment, for they were all of the more favourable nerve and tuberculoid type, and of comparatively short duration. Most of them showed some degree of improvement in sensation and in the movements of the fingers. In Burma, Lindsay reported the detailed changes in five to twelve days after the commencement of treatment in 20 cases, all nerve or predominantly nerve cases. Here again, in rather more than half the cases, improvement of sensation was noted to some extent and in the remainder that condition was stationary; in four cases nasal ulceration, and in four others ulcers elsewhere, showed some improvement. In several cases some improvement was observed in the movements of the facial or hand muscles, but in about an equal number the condition remained stationary. Fortunately, a further general report on the results 40 days after the commencement of the treatment was received from Lindsay, in which he reported further improvement in the ulcers of some cases, but retrogression in others. A further report three months after the first treatment summarizes the results up to that time briefly thus: some improvement of minor nerve lesions of the fingers and eyelids had been maintained; some ulcers had healed remarkably, others showed no change or became worse, and some new ones appeared. The results regarding anaesthesia were equally variable and in quite a number the areas increased in number and size. All the patients said they felt better in health; but most relapsed within four to eight weeks.

Apart from four old cases there remain an important series of 75 cases treated in different places in the Dutch East Indian Islands, some of which had previously been reported elsewhere. Here again

with the exception of five very advanced cases reported on over one year after treatment (but all of whom died within the next year or two) the time of the reports, after commencement of treatment, varied from 1½ and 2½ months, through five weeks, down to a few days, so only the early results of the use of the serum are available in a proportion of cases. It is, however, noteworthy that in the five advanced cases reported over a year later, paralyses and ulcers of the extremities were noted to be improved in all, ulcers of the nose in four, sensation in two and in four the patients stated that their sight was better, although no tests are recorded. In three the general condition was improved, in one stationary and in one worse. Of the 69 cases observed from a few days to 2½ months, sensation was noted to be improved in more than half, paralyses in about one-third, nasal ulcers improved in over one-third, in a number of which they had healed, and ulcers of the extremities had improved in about one-fifth with occasional healing. These data are in very fair agreement with those above from other countries when we take into account that a number of predominantly lepromatous cases are included in the Dutch East Indies series. Two of the Dutch series reported on elsewhere furnish some later information. Seven cases reported from Batavia by BOENJAMIN [see this *Bulletin*, 1940, Vol. 37, p. 46] showed improvement in two, improvement coupled with retrogression in three, stationary one and worse one. Again, cases 30 to 52 at Semarang, without detailed data, were reported on by MALAIHOLLO [see this *Bulletin*, 1939, Vol. 36, p. 694], who found no benefit in lepromatous cases, temporary improvement in nasal symptoms in nearly all the cases, improvement in other than perforating forms of ulceration, in anaesthesia, in anaesthetic macules and in paresis in a few only.

Lastly, a report by BALIÑA, who, contrary to the advice of Reenstierna, treated 10 rather advanced lepromatous cases, records that he "could not establish any evident (? evidence) of improvement." This result is confirmed by the analysis of the reviewer which showed that in several lepromatous cases injections of the serum were followed by febrile reactions accompanied by deterioration of the patients, in one case to a serious degree. Baliña's experience is a confirmation of Reenstierna's advice on this point.

The remaining brief general reports of trials of the serum recorded in this book for the sake of completeness are in accordance with the above analysis. We may therefore conclude that the very moderate claims of the author that in nerve forms of leprosy rapid amelioration, for a time at least, of sensory and paralytic symptoms, healing of ulcers in the nose and of non-perforating ulcers of the extremities, and occasional improvement in macules, often follow the injections of his serum, which may therefore be of some value as an "adjuvant" to other treatment of leprosy. There is not, however, yet sufficient evidence to show that such amelioration is commonly of a lasting nature.

L. Rogers.

TRANT (H.). **Clinical Observations and Notes on the Treatment of Early Leprosy with Diphtheria Antitoxin.**—*East African Med. Jl.* 1942. Aug. Vol. 19. No. 5. pp. 147–149.

This note records that about 15 patients in the early stages of leprosy, who were awaiting discharge and repatriation, were at a Nairobi hospital given a variable number of intramuscular injections of

2,500 units of diphtheria antitoxin bi-weekly. There were no general or febrile reactions and only slight neuritic pains were noted. The results of the injections on the local lesions were on the whole "moderately encouraging," but no bacteriological controls were made. In maculo-anaesthetic cases the results were more disappointing. The method is thought to be worthy of further trial. *L. Rogers.*

PERVES. Application de l'infiltration du ganglion étoilé au traitement des troubles trophiques du membre supérieur dans la lèpre. [**Ganglion Infiltration in the Treatment of Nerve Leprosy.**]—*Rev. Sci. Méd. Pharm. et Vét. de l'Afrique Française Libre.* Brazzaville. 1942. July. Vol. 1. No. 1. pp. 76–80.

The results of infiltration of novococaine in the region of the inferior cervical, or stellate, nucleus of the sympathetic in the treatment of leprous nerve lesions of the upper extremity are recorded. The method is based on the proved value of such treatment of trophic and sympathetic lesions in general. A strong needle is inserted 4 centimetres from the middle line on the affected side, and on striking the first rib the needle is directed under its inferior border to a depth of 2 centimetres. After aspirating to make sure a vein has not been entered, 3 to 4 cc. of a freshly prepared 2 per cent. solution of novocaine is injected. At the end of an hour congestion of the corresponding limb is observed, and if it lasts at least two or three days, good results may be hoped for. No dangerous reactions occurred in the cases treated, but operations on the left side were sometimes followed by anginal pain. Within a few hours recovery of the functions of the fingers is obtained, oedema is absorbed within two days and ulcers heal within a week. Attempts at lumbar infiltrations were not successful. Notes of ten cases illustrate the results obtained. *L. Rogers.*

MACKAY (A. G.). **The Control of Leprosy and Tuberculosis in Rural Areas of the Tropics.**—*East African Med. Jl.* 1942. Aug. Vol. 19. No. 5. pp. 150–153.

The author discusses complete segregation of lepers in leprosaria, and partial segregation in village communities in which the patients, while living rather apart from the main villages, could carry on their agricultural work and continue some degree of social intercourse other than home contact with non-lepers. For East Africa the latter system would appear to be more suitable, and it could be combined with similar partial segregation of tuberculous persons. The aim should be that the patients should not feel too completely separated from their fellows, yet reasonable isolation should be possible. *C. W.*

HELMINTHIASIS.

WARNER (B. W.). **Anorectal and Colonic Manifestations of Schistosoma Mansoni Infestation (Intestinal Bilharzia).**—*Amer. Jl. Surgery.* 1942. July. Vol. 57. No. 1. pp. 168–172. With 3 figs.

This paper is mainly a statement of the life history and pathological effects of *Schistosoma mansoni*, with a warning to American surgeons

that they should be on the look-out now for cases of all the schistosomiases in soldiers and others returning from areas in which this disease is endemic, *S. japonicum* coming also into the picture.

The author describes one case of infestation with *S. mansoni*, a woman aged 26, who was born in Porto Rico and had lived there for 20 years before coming to New York. She was operated on for chronic salpingo-oophoritis, corpus luteum cyst of the ovary and fibrosis of the appendix. There was then no eosinophilia in the blood, but there was a slight eosinophilic infiltration of the muscularis of the appendix. After the operation the patient still had slight rectal pain and bleeding. Examination showed a tender post-anal crypt with posterior fissure and multiple small papillomata near the recto-sigmoidal junction; above this junction the sigmoid was normal. The stools were not examined.

The post-anal crypt was excised and eggs of *S. mansoni* were found in it. The sections of the ovary and Fallopian tube and the appendix made when these were removed were then examined, but no eggs were found in them.

The posterior ano-cutaneous wound developed excess granulation tissue, but no eggs were found in this. The sigmoid showed punctate bleeding areas, which were interpreted as points from which eggs had escaped. Repeated stool examinations and direct rectal smears showed occasional distorted eggs. About a month after the second operation the blood showed an eosinophilia of 7 per cent., this being the first time it had been noted. At the same time X-ray examination of the chest showed the presence, in the right apex, of small areas of infiltration, which were interpreted as being probably areas of infiltration of the lungs by *S. mansoni*. These infiltrations subsequently disappeared.

When the author wrote his paper the patient was feeling well, but the bleeding areas in the sigmoid and rectum were still present. Intramuscular treatment with fouadin had been begun. *G. Lapage.*

MAGATH (Thomas B.). **Lethal Dose of Chlorine for Cercariae of** *Schistosoma mansoni.*—*U. S. Nav. Med. Bull.* 1942. Jan. Vol. 40. No. 1. pp. 237–238.

Active cercariae of *Schistosoma mansoni* which had recently emerged from the snail *Australorbis glabratus* were treated with varying amounts of Perchloron. Notes were taken of the times when the movements of the cercariae ceased and when all activity of their organellae stopped. The table, here reproduced, gives these results:—

Experiments to test the amount of chlorine necessary to kill cercariae of Schistosoma mansoni.

Strength of chlorine (parts per million)	Time to kill	Residual chlorine (Orthotolidin) after 30 minutes	Strength of chlorine (parts per million)	Time to kill	Residual chlorine (Orthotolidin) after 30 minutes
	Minutes	Parts per million		Minutes	Parts per million
10·0	1	3·0	0·4	11	0·2
2·0	4	0·8	0·2	30	0·1
1·0	6	0·4			

The author says that it appears from these experiments that chlorination to the degree of 0·2 parts per million kills the cercariae in 30 minutes and not only makes the water safe, but leaves a margin to avoid biological failures and human errors inherent in water treatment.

Everyone going to Porto Rico and Vieques should be warned not to bathe, wade or swim in any of the fresh-water streams or in the water of any locality, unless they are sure that human beings do not frequent the waters above their source of supply. All the streams in these islands should be regarded as being contaminated since a very large proportion of the population have schistosomiasis. The author concludes, from the nature of cercariae and from experiments with amoebic cysts, that rapid gravity sand filters would also render the water safe, but filtration is not always possible, and washing and bathing water must also be treated. The often-used method of chlorinating water to the degree of 0·2 parts per million is an efficient method of freeing such water from cercariae. [See also this *Bulletin*, 1938, Vol. 35, p. 600; 1940, Vol. 37, p. 148.] *G. Lapage.*

HOWARD (Stanford). **Rare Appearance of Clonorchis Sinensis in England.**—*Post-Graduate Med. Jl.* 1942. July. Vol. 18. No. 200. pp. 125–127. With 2 figs.

Human liver flukes are rare in the British Isles and are usually found only at operation.

A woman, aged 50, who had lived all her life in England and South Wales, came to the author complaining of jaundice; she had been well until six weeks before. She was deeply jaundiced, but there was no abdominal tenderness. Van den Bergh's reaction showed a strongly positive indirect result. The author thought the case was more than one of haemolytic jaundice and operated.

The gall bladder was found to be distended and it contained 60 stones with an average diameter of 0·7 cm. Cholecystotomy was done. The common bile duct was indurated at the point of its entry into the cystic duct; it was opened below this point, but no bile appeared. There was complete fibrous stenosis of the common bile duct at its junction with the cystic duct.

In the hepatic duct a disc-like body, greenish brown and about as big as a waistcoat button, rubbery in texture and slightly curved in its long axis, was found. This was diagnosed as a specimen of *Clonorchis sinensis*. No eggs were found in the mucosa of the gall bladder. Numerous operculated eggs were found in the faeces. [The illustration accompanying this paper is not of the actual specimen but is taken from a textbook; it is not possible, from the information given, to confirm the accuracy of the diagnosis. Recently *Fasciola hepatica* was found in the common bile duct of a patient in Britain, see this *Bulletin*, 1941, Vol. 38, p. 382.]

The eosinophilia rose to 11·2 per cent. (672 eosinophils in 1 cmm. of blood, the normal being 72 to 300 per cmm.). The patient was treated with injections of 2 cc. of collosol antimony. The first injection was given on the thirty-first day after the operation; five others were given at intervals of three days. After a week the patient went home and a second course of injections was given; she has remained well since.

Clonorchis sinensis infestations are confined to China and Japan and the trematode requires two intermediate hosts before it can infest man. Man is infested by eating uncooked freshwater fish. There is

no likelihood that this patient could have infested others in England. With the help of the Ministry of Food the author found that Licences had been issued for the importation of small quantities of dried fish from China (Hong Kong), the bulk of the fish thus imported going to Soho. These imports ceased in May 1940. The author thinks that it is conceivable that his patient ate some of this fish in an uncooked salad and thus became infested. *G. Lapage.*

SKVORTZOV (A. A.) & TALYSIN (F. F.). **On the Cycle in the Development of the Tape-Worm of** *Diphyllobothrium minus.—Travaux Acad. Milit. Méd. Armée Rouge U.R.S.S.* Moscow. 1941. Vol. 25. [In Russian pp. 322–329. With 7 figs. English summary p. 330.]

" An expedition of the Department of Parasitology of the All-Union Institute of Experimental Medicine named after A. M. Gorky, worked on the island of Olkhon (lake Baikal), in the summer of 1938. The aim of the expedition was to analyse an isolated focus of helminth diseases and to organize the means of control of helminthic infestations in this focus.

" The examination of the fishermen's population showed that 42 per cent. of the inhabitants were infected with worms ; 35 per cent. with *Taeniarhynchus saginatus* [*Taenia saginata*] and 7 per cent. with tapeworms (Diphyllobothrium).

" For the purpose of studying the cycle of development of the endemic tape-worm, the authors carried out experimental work, which permits the following conclusions :

" 1. The population of the coast of the lake Baikal is infected through the fishes : *Coregonus migratorus* Georgi, *Thymallus arcticus* Pall., *Coregonus lavaretus pidschian n. baicalensis* Dyb.

" 2. The eggs of the *D. minus* and *D. strictum* give ciliated embryos (coracidia), which float in the water and are swallowed by certain minute eucopepod crustaceans (Cyclops sp.). Other larvae, the procercoids, develop in the cavity of the body of these crustaceans but differ in structure from the well studied procercoid *D. latum.*

" 3. The infected crustacean (*Cyclops strenuus*) are eaten by fishes and on the walls of the intestines of the latter capsules are developed where a third species of larvae, the plerocercoids, are disposed ; the plerocercoids of *D. minus* develop in large capsules and the plerocercoids of *D. strictum* in small capsules.

" 4. Man is infected with the tapeworm in eating the abovementioned fish in the way of " stroganina " (frozen raw fish cut into little bits) or in some other kind of fish where the plerocercoids have not been killed.

" 5. Thus the expedition was the first to elucidate the cycle in the development of *D. minus*, which appears to be the endemic species for the Baikal ; and to receive the data which permit of liquidating the Diphyllobothrium foci among the population of Siberia."

ANDREWS (James C.) & WEBB (Bailey D.). **The Effect of Hookworm Damage on Levels of Quinine attained in Blood and Urine of Dogs following Single Doses of Quinine Sulfate.**—*Jl. Pharm. & Experim. Therap.* 1942. July. Vol. 75. No. 3. pp. 191–195. With 2 figs.

Some clinical workers have ascribed the lack of response of some cases of malaria to quinine to the co-existence of hookworm infestation.

The authors therefore set out to find whether, when quinine is given to dogs, hookworm damage to the small intestine alters the concentration of quinine in the blood and also its excretion in the urine.

Two dogs were used. Their existing mild parasitic infestations (the species of parasites is not given) were removed by giving 10 cc. of tetrachlorethylene with 15 cc. of magnesium sulphate and 4–5 days were allowed for the gut to heal. Before the dogs were experimentally infested with hookworm each was starved for 24 hours and given, usually in capsules, 20 mgm. of quinine sulphate per kgm. dog weight, which represents about the total of the doses per kgm. given in 24 hours in human cases of malaria, and about three times as much as any single dose given to man. Quinine determinations were made by the method of Kyker, Webb and Andrews. This method does not reliably detect amounts of quinine less than 0·7 mgm. per litre. The results are compared with control samples of blood and urine taken before giving the quinine.

Fifteen to thirty minutes after the quinine, both dogs, as well as others used in preliminary work, showed signs of cinchonism (evident nervousness and increased respiration rate, the latter returning to normal in about 40 minutes). Three such experiments were done on each dog. Then both were given what proved to be only a light infestation by spraying about 2,000 hookworm larvae into the mouth. No marked changes were found in the blood or urine.

The dogs were then reinfested by subcutaneous inoculation of 6,000 larvae and a moderate infestation resulted, with a few hundreds up to 10,000 eggs per gm. (Stoll egg-counting method). Quinine was then given at intervals of one, two, three and six weeks after the reinfestation and curves typical of those obtained with moderate hookworm infestations were obtained. Seven weeks after this reinfestation both dogs were given 10 cc. of tetrachlorethylene and 15 cc. of magnesium sulphate. The collection of faeces showed that dog A had then 88 worms and dog B 75 worms. One week later repeated egg counts were negative. The doses of quinine were then repeated.

The curves obtained of the blood concentration and urinary excretion of quinine are illustrated. They show that moderate hookworm infestation has little or no effect on either the maximum blood level of quinine reached, or on the time elapsing between the giving of the dose and the attainment of that maximum. This conclusion is based also on other experiments not recorded here. In general, almost all the maximum levels of blood quinine attained lay between 3 and 4 mgm. per litre and the time needed to reach these was ½–2 hours.

In dogs with a moderate hookworm infestation the blood quinine sometimes, but not always, reaches higher levels and is maintained longer than in dogs freed from hookworms, possibly because there is, in the infested dogs, an impairment of the mechanism of the metabolic decomposition of quinine; the authors are investigating this question.

Two points are emphasized. The apparent concentration of quinine in the blood shown by the authors' method represents the difference between the rate of income from the small intestine and rate of outgo, the latter being roughly divisible into excretion by the kidney and metabolic destruction. In general, the total recoveries from the urine varied from 4–12 per cent. of the quinine given. The method of Kyker, Webb and Andrews does not distinguish between quinine and other cinchona derivatives; but the authors are not aware that anyone has shown that any unaltered quinine is excreted in

the urine and they conclude that only a comparatively small percentage, if any, of the quinine given by the mouth reaches the urine unaltered.

G. Lapage.

RAO (S. Sundar). **Observations on Filariasis in Lakhipur and Binakandy Tea-Gardens (Cachar District, Lower Assam).**—*Indian Jl. Med. Res.* 1942. Apr. Vol. 30. No. 2. pp. 345–350. With 1 map.

Rao made a filarial survey of nine villages in the tea gardens of Lower Assam. In seven of these villages filariasis is endemic, the infestation being chiefly due to *Wuchereria malayi*. It is probable that the villages were quite free of the disease until about 30 years ago and that the infestation was introduced from Bihar.

A map of the area shows the nine villages, which lie within 1–3 miles of each other in an area of 28 square miles. The soil is mostly clay or sand and the humidity ranges from 70 to 100 per cent. from April to October, the average rainfall being 130 inches a year. The total population of the villages is 4,846, being composed of Bengali settlers and coolies from all over India. Water is obtained from wells and from the rivers. There are no drains or sanitation and the people defaecate in the scrub, jungle or on open ground.

Examinations of 2,455 persons were made at night (from 9 p.m. till midnight). Of these 115 had microfilariae in their blood at night (4·7 per cent.) all being infested with *W. malayi*, except five from one village, who had *W. bancrofti*. The villages of Naidal and Robipur had high infestation rates of 28·2 per cent. and 18·9 per cent. respectively. Tables give these results. There was no difference in the degree of infestation of males and females.

Clinical signs of filariasis were found in 110 persons (4·5 per cent.). Elephantiasis of the leg was found in 89 cases, of the arm in 16, of both leg and arm in 4 ; only one patient had a hydrocoele, this being the sole case of affection of the genitals. There was no case of chyluria.

Comparison of figures obtained by FRASER in earlier surveys indicated that there had been no increase in the incidence of the infestation, but there had been, in all of the villages in which the disease was endemic, an increase in the number of cases of filarial disease. The infestation does not seem to have spread to neighbouring villages. It is remarkable that villages in extensively cultivated areas were practically free from the infestation, while those in the swampy areas showed a high incidence.

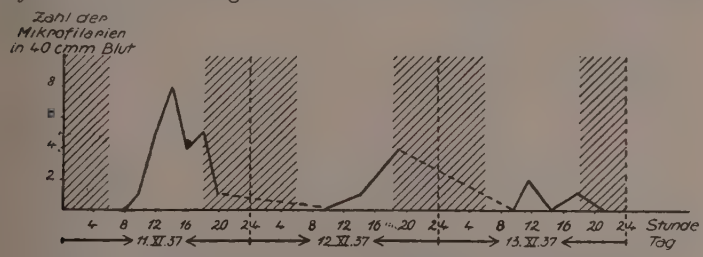
A list of the mosquitoes found is given. There were several species of Mansonioides, breeding in association with *Pistia stratiotes* and with "Dob" grass. *Culex fatigans* was found only in the village in which *W. bancrofti* infection was present.

G. Lapage.

GÖNNERT (Rudolf). Zur Lebensdauer menschlicher Mikrofilarien. [**The Duration of Life of Human Microfilariae.**]—*Zent. f. Bakt.* I. Abt. Orig. 1942. June 30. Vol. 149. No. 2. pp. 75–81. With 3 figs. [10 refs.]

Various attempts have been made in the past to investigate the cause of microfilarial periodicity by transferring microfilariae from one person into a fresh uninfected person, so that the behaviour of the microfilariae could be studied in the absence of the adult worms. The present paper contributes a new experiment of this type.

A patient from the Cameroons was found at Hamburg to be heavily infected with *L. loa* and *A. perstans*. On November 10th, 3 p.m., 160 cc. of his blood were taken and injected intravenously into the author, with practically no delay. Examination of the blood was made, at intervals, by taking films of 20 cmm. of blood, and later by concentrating the larvae from 5 cc. blood. The transferred blood contained approximately 1,640,000 *Mf. loa* and 112,000 *Mf. perstans*. Accordingly it could be calculated that the author's blood should contain 13 *Mf. loa* and 1 *Mf. perstans* in 40 cmm. ; actually, 15 minutes after the transfusion only 4 *Mf. loa* were found in 40 cmm. taken from the ear. The number of *Mf. loa* found in the blood on the following days is shown in the figure.



Number of *Microfilaria loa* found in samples of the author's blood at intervals after intravenous injection of infected blood of patient.
Vertical scale: Number of Microfilariae in 40 cmm. of blood.
Horizontal scale: Hour and day of observation.
[Reproduced from the *Zentralblatt für Bakteriologie*.]

As is seen, a definite diurnal periodicity of the microfilariae was observed. On November 14th no microfilariae were found in eight drops of blood. On November 16th 5 cc. blood were examined and no *Mf. loa* could be found. Unfortunately, observations on November 12th and 13th could not be made as regularly as was desired owing to the unanticipated reaction which followed the transfusion.

The infection with *Mf. perstans* took quite another course, as is shown by the table, which gives the number of *Mf. perstans* per 5 cc. blood :—

Table I.

Date	No. of Mf.	Date	No. of Mf.
11.11.36	54*	10.2.37	5
12.11.	125*	3.3.	1
13.11.	50*	19.3.	27
14.11.	—	24.5.	16
16.11.	4	25.8.	23
25.11.	12	15.9.	3
2.12.	12	28.1.38	3
9.12.	26	13.7.	2
16.12.	15	16.3.39	13
31.12.	11	28.12.	1
13.1.37	22	6.41	—
27.1.	17	16.2.42	—

* Calculated values only, from samples of 40 cmm. blood taken several times each day.

It appears from this table that most of the *Mf. perstans* disappeared from the blood in the first few days, but that some persisted for at

least three years. A similar long duration of life was observed by FÜLLEBORN in *Mf. repens* transfused into a fresh dog; the microfilariae persisted 2¾ years, and during this time they doubled their size. In the author's case, microfilariae were drawn under the microscope as they became moribund in a fresh preparation; the lengths of seven larvae ranged from 168 to 200μ (average 190μ). This figure agrees well with the dimensions given by LANGE for microfilariae fixed in formalin, *viz.* 199·5μ long.

The author had never visited any region with endemic filariasis and so the possibility of latent infection could be completely excluded. A severe febrile reaction was experienced beginning on the evening of the day of the transfusion, maximum on the next day and subsiding by the sixth day. For five weeks after the transfusion the eosinophil percentage was raised to 8–12. It is not clear whether the febrile reaction was due to the blood transfusion, or to the disintegration of the majority of the microfilariae.

[The author deserves congratulation for his courage in submitting to this crucial experiment. It is a great pity that more detailed examinations of the blood were not made, using a concentration technique throughout, and particularly that more measurements were not made during the first and second nights. Nevertheless it seems improbable (although just possible) that the results depicted in the graph are due only to chance. It may now be taken as proved by the above experiment and by those of KNOTT (this *Bulletin*, 1936, Vol. 33, p. 129) and of the reviewer (this *Bulletin*, 1941, Vol. 38, p. 147) that microfilariae of *L. loa* and of *W. bancrofti* can live in the blood of a fresh non-immune subject for four to eight days; whether they can live equally long in a patient, who must have developed some degree of immunity reaction to them, is unknown, but it seems likely, since microfilariae of the *perstans* or *repens* type can live for over two years. The observations recorded in the above graph make it highly probable that such surviving microfilariae exhibit diurnal periodicity, *i.e.* the periodicity depends upon the microfilariae plus the host, and not upon cyclic parturition by the adult females, as suggested by LANE and O'CONNOR. However, the question cannot yet be considered as completely proved and further evidence is desirable.] *F. Hawking.*

i. VAN DEN BERGHE (Louis). Recherches sur l'onchocercose au Congo Belge. Ier mémoire. La transmission d' *Onchocerca volvulus* par les Simulies. [**Researches on Onchocerciasis in the Belgian Congo. First Memoir. The Transmission of** *Onchocerca volvulus* **by Simuliidae.**]—*Ann. Soc. Belge de Méd. Trop.* 1941. Mar. 31. Vol. 21. No. 1. pp. 63–76. With 5 figs. on 3 plates.

ii. ——. Recherches sur l'onchocercose au Congo Belge. IIe mémoire. Les vers adultes et leur localisation chez l'homme. [**Second Memoir. The Adult Worms and their Localization in Man.**]—*Ibid.* June 30. Vol. 21. No. 2. pp. 167–187. With 2 figs. on 1 plate. [27 refs.].

iii. ——. Recherches sur l'onchocercose au Congo Belge. IIIe mémoire. Les aspects cliniques de l'onchocercose humaine. [**Third Memoir. The Clinical Aspects of Human Onchocerciasis.**]—*Ibid.* Sept. 30. Vol. 21. No. 3. pp. 261–291. With 3 plates. [Numerous refs.]

These three papers give a detailed review of the literature of this complex subject, with accounts of the author's researches and their

bearing on the results and conclusions of other workers. A summary can note only the salient points and must necessarily leave out most of the interesting discussion, which must be read in detail if it is to be fully appreciated.

The author worked in 1936 in various regions of Uele, near Buta, Titule, Niangara, Dungu and Faradje.

i. The first memoir points out that nobody has yet proved that Simulium can transmit *Onchocerca volvulus* from man to man. BLACKLOCK found larvae of *O. volvulus* in the midgut of 2·6 per cent. of 78 specimens of *S. damnosum.* van den Berge found microfilariae in the thoracic muscles of rather more than 1 per cent. of 1,320 specimens of *S. damnosum.* A higher percentage of larvae was found in the midgut of Simuliids captured on men harbouring many dermal microfilariae and, after some hours, there was an increased number of larvae in the thoracic muscles. The author agrees with Blacklock's view that "in so far as experiments with wild flies can be accepted as evidence, in the absence of actual transmission to man and animals, *S. damnosum* is a vector of *O. volvulus.*"

S. damnosum seems to be the dominant species biting man in the Belgian Uele. Simuliids in some parts of Uele live under ecological conditions identical with those found in Guatemala. These conditions and the biology of the larvae of Simulium are described. The distribution of the larvae and adults in Uele is indicated. The adults are found most easily near rapidly-running rivers and streams; the females bite especially in the morning between 6 and 8 o'clock, as well as in the evening; they avoid bright light and great heat and will bite, in the shade, at all hours of the day. After rain they were found as far as 500 metres from the river Bima. The biology of African Simuliidae is similar to that of the American species, but the African species differ in one important particular—they bite low on the body, usually lower than 1 metre above the ground, whilst the American species bite on the head and upper parts of the body, usually higher than 1 or 1½ metres above the ground. Small boys of 10 years were used as collectors of flies, each having another boy who caught the flies in tubes while they were in the act of biting. The bites on these boys were, when the boys stood upright, most frequent on the ankles and legs, usually below the knee; when the boys squatted, as the natives often do for various purposes, the bites were on the thighs, legs, hips, thorax and even the head; but children put upright on a table escaped almost completely, although children put on the ground beside the same table had numerous bites on their ankles and legs.

There seems to be a relation between the position of the bites and the situations of the adult worms in man; this is discussed in the second paper.

The degree of infestation of Simuliids in Uele seems to be higher (Titule 18, Ekwankatana 13·3, Niangara (R. Gada) 8·5, Niangara (Uele) 7·3 per cent.) than that in Guatemala (5 per cent.). It approaches the degree of infestation in Uganda (14 per cent.) but does not reach that recorded elsewhere in the Belgian Congo (33·3 per cent. at Kasai).

A list of the 20 species of Simulium known in the Belgian Congo is given.

Three types of larva found in the blackflies are described: (1) Dermal larvae from the skin, very mobile, 200–300 by 5–8μ, easily recognized in the intestine of the fly; (2) "Little sausage" forms, very refractive, 200–300 by 26μ, in the thoracic muscles: (3) Larvae like (2), but more

slender, found in the thoracic muscles and mouth parts, 350–450 by 17·5μ, the so-called infective larvae; these are exceptional in the mouth parts. The author does not think that more than these three forms can be recognized. The dermal forms in the gut of the insect were always rare in 1,945 dissections, possibly because the flies were collected from subjects not infected with Onchocerca. The differentiation of infective and "little sausage" forms seems to the author to be analogous to the differentiation of sporocysts and sporozoites in Anopheles, and not to be useful for the establishment of degrees of infestation of Simuliidae. "Little sausage" forms are evidence of recent infestation and the percentages of these were high at Ekwankatana and Titule, where onchocerciasis is especially prevalent. The high degree of infestation and the impossibility of avoiding bites render prophylaxis an insoluble problem.

ii. The second memoir begins with the history of the genus Onchocerca.

The author has demonstrated for the first time the presence of adult females of *O. volvulus* in full reproductive activity *outside* the nodules. These were found at post mortem examination in two men at Buta in Lower Uele. One man, aged 60, had one unencapsuled female in the adipose connective tissue of the right trochanteric region; a photograph of this worm and its surrounding tissue is given. In this man fragments of disintegrating Onchocerca were found in three other nodules, partly caseous, in the pelvic region; fragments of another worm were removed from the fibres of the fascia lata of the right thigh.

The other man, aged 25, had a similar adult female in the connective tissue of the left trochanteric region. Living and adult Onchocerca were also found in three nodules in the pelvic and costal regions.

In 1,704 individuals examined in Uele, 66·3 per cent. had dermal microfilariae, 61·2 per cent. had nodules. The excess of those with dermal larvae can perhaps be largely attributed to larvae derived from free adult worms not encapsuled; these cannot be detected even by the most careful palpation.

The bearing of this discovery of free, unencapsuled adult worms in the tissues of man on existing views about the localization and migration of adult Onchocerca is discussed at some length. There is little experimental evidence on these questions, because Simuliids bred in captivity do not bite, captured wild ones bite man only irregularly, and no suitable experimental animal is known; experiments on man are difficult, if only because in Uele every individual is under suspicion of infestation. Blacklock and the author tried unsuccessfully to use monkeys and chimpanzees.

The practice of wearing pelvic girdles of various kinds and, in America, tightly fitting straw hats, may help to determine the low sites of bites in Africa and the high sites in America, but these factors should not be given too high a value as contributory causes of the sites of the nodules. The slow migration of the larvae and the connective tissue reaction of the host will stop the migration and the larvae will be arrested at the osseous planes nearest to the bites; constrictions by girdles and hat brims may help this. In Africa the flies bite low and nodules containing the worms are also low down on the body in natives who wear few clothes. In negroes in Uele 87·9 per cent. had low nodules (knee, sacrum, and especially the trochanters and iliac crests), 10·6 per cent. had them at middle height (vertebral column, elbow and sides), while 1·3 per cent. had them high on the body (shoulder and

cranium). In Europeans, on the other hand, nodules were more often at middle height (14·2 per cent. pelvic and trochanteric) or high up (37·5 per cent.). This fact seems to be associated with their clothing. The predominance of high sites of nodules in America seems to be associated with the fact that the flies there bite even naked persons on the upper part of the body ; the ocular complications of the disease may also be associated with this predominance of the highly situated nodules (see third paper).

The histology of the nodules is discussed. Five categories are established, according to the nature of the material withdrawn from them with a needle : (1) Nodules with eggs liberated by damage of the contained female by the needle. (2) Nodules with few larvae and no eggs. (3) Nodules with greenish, syrupy or caseous pus without eggs or larvae. (4) Cold abscess full of pus and sometimes the cuticular remains of worms. (5) Fibrosed nodules without eggs, larvae or pus.

Puncture was carried out in 405 nodules found among 582 individuals ; 240 belonged to category 1, 125 to 2, 28 to 3, 7 to 4, and 5 to 5. These five categories express the process of degeneration of the worms in the nodules, which may be formed around one, two or several worms. The worm is sooner or later destroyed, the nodule is usually fibrosed and calcification follows ; but a purulent focus may form (cold abscess) followed by spontaneous fistula formation, leaving scars which are frequent in the trochanteric region (see third paper).

iii. The third memoir discusses the little-known general manifestations of onchocerciasis. Eosinophilia varied in the author's cases from 15 to 35 per cent. Early signs are not noted by the natives and have not been seen in Europeans. In Africa and America some swelling of the face, coppery shine of the skin and appreciable cachexia have been ascribed to the disease, but these may well be due to other causes. Local signs round the nodule are allergic in nature. Intradermal nodules often escape observation, because they are very small ; they are often only identifiable microscopically. Fibrosis, caseation and calcification go on without any marked clinical signs. The cold abscess alone causes pain, loss of function and fistula formation, which leaves scars, common in the trochanteric region. The nature of the so-called "juxta-articular nodules" is discussed ; the author emphasizes the facts that they are rigorously symmetrical in their distribution and are extremely hard and almost impenetrable by a needle ; they contain a uniform fibrous tissue ; the author thinks that they are not due to Onchocerca.

Cutaneous manifestations of the disease are discussed ; it is difficult to connect them with certainty with Onchocerca in a district like Uele where almost the whole population is infested. They are never pathognomonic ; prurigo may be due to other causes, *e.g. Loa loa* and *A. perstans*, or may be anaphylactic and related to some unknown antigen. The author observed some cases of papular dermatitis, pachydermy and lichenification from which all filarial origin seemed to be excluded. His experience in Uele led him to conclude that the terms "filarial itch" and "cutaneous onchocerciasis" are not justified by experimental observations ; he discusses his reason for this view.

Less controversial are ocular manifestations (irido-cyclo-choroiditis, punctate keratitis, and pannus, according to the ophthalmologist HISSETTE [see this *Bulletin*, 1938, Vol. 35, p. 767]) in patients with cranial nodules (the percentage of which is low in Uele) and in patients with microfilariae in the conjunctiva. Statistical returns of the

incidence of ocular onchocerciasis cannot be compiled because the doctor attracts to himself blind people eager for cure and villages lose part of their young men who go to work elsewhere in mines and plantations. The author thinks that there is nothing to distinguish the American species, *O. caecutiens*, from *O. volvulus*.

The views of earlier workers on the ocular manifestations are discussed at length. The author himself examined only patients with nodules and with and without eye troubles, and blind people (those who could not count the fingers of one hand at a distance of 1 metre) with and without nodules. Strips of the conjunctiva were examined for larvae. Out of 37 such patients, 28 of whom were blind, 12 of the blind had conjunctival larvae and they alone could be considered as suffering from ocular onchocerciasis ; 6 of them had cranial nodules (on the left or right mastoid) ; in 5 of them the eye on the same side as the nodule alone had larvae ; in the 6th both eyes had larvae. The author thinks that the nodules seem to influence the eyes in this respect. The six blind people without cranial nodules had thoracic or pelvic nodules and may have had small impalpable ones higher up, or free unencapsuled worms.

Nine patients with cranial nodules (two on the forehead and seven on the mastoid) had little or no ocular lesions ; one of the seven was a child of two years ; larvae were found in the conjunctiva in only one of them and only in one eye, which was otherwise intact. Of the eight patients without larvae two had not very characteristic punctate keratitis with normal pupil, iris and reflexes. The blindness of the 16 without cranial nodules was perhaps due to causes other than onchocerciasis.

Lumbar puncture in the 12 blind cases revealed larvae in only one, but the author concluded that the larvae had come from the skin and not from the cerebrospinal fluid. Lumbar puncture in 20 control cases yielded larvae only from the skin through which the needle entered. The author thinks that in all reported cases of larvae found in the cerebrospinal fluid the larvae really came from the skin at the site of the puncture.

Affections of the lymphatic glands also give rise to controversy. Their aetiological connexion with onchocerciasis is not firmly established [*cf.* RODHAIN, below]. Adult *O. volvulus* are not endolymphatic like *W. bancrofti* ; only their larvae penetrate the lymphatic glands.

Elephantiasis in Uele is chiefly genital and may reach considerable proportions ; it may also occur on the legs, but is never well developed there. The genital form often occurs together with nodules of onchocerciasis, but the geographical distribution of the two does not coincide. In 26 cases of genital elephantiasis examined by the author only 11 had microfilariae without sheaths.

A new form of larva is described, which was found alone in two cases and associated with larvae of *O. volvulus* in four others. It is possibly a third form of the larva of *O. volvulus* or the larva of a new species. It had no sheath, measured 380–450 by 9–11μ and its posterior end was bent twice at right angles, so that it has the shape of a bayonet ; this shape was preserved during its figure-of-eight movements.

The larvae of *W. bancrofti* are not found in the nocturnal blood at several places in Uele. Larvae of *O. volvulus* are rare in the peripheral blood. The author agrees with DUBOIS that the intervention of *O. volvulus* is not necessary to cause African elephantiasis, although this

parasite may favour its causation. Affections of the glands and elephantiasis in Africa are often due to causes other than onchocerciasis.

Clinical diagnosis of nodular onchocerciasis is not difficult. Differential diagnosis is discussed. Surgical removal of the nodules, or of groups of nodules, is better than the injection into them of substances designed to kill the worms. Removal of cranial nodules is said to improve the ocular complications. But removal may fail, doubtless because of the existence of impalpable nodules or of unencapsuled adults and because the larvae are long-lived.

Prophylaxis is impossible. An enormous reservoir of the parasites exists in man, buffalo and antelope. Simuliidae cannot be eradicated and their bites cannot be avoided. Clothes are man's only means of partial protection. *G. Lapage.*

RODHAIN (J.). Un cas d'onchocercose avec polylymphadénopathie chez l'Européen. [**On a Case of Onchocerciasis with Generalized Lymphadenitis in a European.**]—*Ann. Soc. Belge de Méd. Trop.* 1942. Mar. 31. Vol. 22. No. 1. pp. 11–17. With 1 fig.

In an earlier paper [this *Bulletin*, 1916, Vol. 7, p. 314] the author had expressed the opinion that *Onchocerca volvulus* could play a part in the aetiology of enlargement of the cervical lymph glands, when the glands were rather hard and yielded by aspiration with a needle a yellowish, syrupy fluid, which only exceptionally contained trypanosomes but quite often contained microfilariae of *O. volvulus*. He notes that VAN DEN BERGHE [above] insisted on the lack of experimental proof of the actual relation between *O. volvulus* and such enlarged glands and agrees that he is right, but thinks a description of the following case is of interest in this respect.

A man aged 39 had first stayed in the Belgian Congo from 1923 to 1927 and had then been in hospital suspected of severe malaria; he had then done two terms of service at Ekwankatana, where van den Berghe found that 13·3 per cent. of Simuliids were infested with *O. volvulus* and that 90 per cent. of the people examined had Onchocerca nodules. In 1937 the patient went back to Belgium and began to complain of nervous and physical exhaustion after a course of atebrin and quinoplasmin. On the basis of an eosinophilia a doctor diagnosed filariasis and prescribed sulpharsenobenzyl. Rodhain found him robust, well-nourished, with a complaint of general fatigue, inability to fix his attention and insomnia. The heart, lungs, liver, tendinous and ocular reflexes were normal. There was very variable enlargement of the lymph glands in different regions. The lateral cervical glands were palpable and hard; it was possible to puncture only one of those on the right side; axillary, popliteal, epitrochlear, crural and inguinal glands were also enlarged.

No trypanosomes were found in centrifuged blood or by gland puncture, and the cerebrospinal fluid was normal. Puncture of the cervical glands revealed no microfilariae, but microfilariae of the *O. volvulus* type were found in the inguinal glands; and in the para-axillary gland, in yellowish, syrupy pus. A search for Onchocerca nodules revealed a small one about the size of half a pea, in a very inaccessible position below the upper border of the right anterior iliac crest. With great difficulty a minute drop of fluid was aspirated from this hard nodule, but no filarial eggs or larvae were found.

The skin was normal, except for slight thickening in the lumbar and crural regions. Biopsy of small pieces of lumbar skin revealed small numbers of microfilariae in the skin, with perivascular infiltration with lymphocytes and plasmocytes, like that which occurs in pruriginous areas. The blood showed 33 per cent. of eosinophils. Faecal examination revealed only *Entamoeba coli*.

The eyes were clinically normal, but, in the right eye, the ophthalmologist found five or six, and in the left eye one, irregularly-rounded infiltrations, without vessels, in the corneal tissue. The patient had no complaint to make about his eyes. There was no trace of superficial punctate keratitis.

There seemed, after this thorough examination, to be no cause other than the microfilariae to explain the enlargement of the glands. Their hardness, indicating that some sclerosis had occurred, also favoured this explanation. The blood examination and the patient's general condition excluded Hodgkin's disease and lymphoid leukaemia. It seemed difficult to admit that the microfilariae found in two out of three glands punctured and in the biopsied bits of skin could explain the whole condition and the author thinks that there must have been other hidden nodules or non-encapsuled adult Onchocerca [*cf.* VAN DEN BERGHE, above]. The fact that no microfilariae were found in the cerebrospinal fluid is emphasized. *G. Lapage.*

SHIKHOBALOVA (N. P.). L'immunité dans les helminthoses. I. L'immunité des souris blanches vers une superinvasion par le *Trichocephalus muris*. [**Immunity in White Mice to Superinfection with** *T. muris*.]—*Med. Parasit. & Parasitic Dis.* Moscow. 1940. Vol. 9. No. 3. [In Russian pp. 245–253. With 2 figs. (18 refs.) French summary pp. 253–254.]

DEFICIENCY DISEASES.

NICOL (R.). Sur douze cas de bériberi observés à Brazzaville. [**Twelve Cases of Beriberi in Brazzaville.**]—*Rev. Sci. Méd. Pharm. et Vét. de l'Afrique Française Libre.* Brazzaville. 1942. July. Vol. 1. No. 1. pp. 81–91. [27 refs.]

ALESSANDRI (H.), PALAZUELOS (P. Garcia) & LERNER (J.). La pelagra del adulto en Santiago de Chile (consideraciones sobre 110 casos). [**Adult Pellagrins in Santiago de Chile.**]—*Rev. Med. de Chile.* 1942. July. Vol. 70. No. 7. pp. 498–508.

The 110 cases analysed by the authors were seen by them during the period 1934 to 1941. Of the total, 93 were men, 17 were women; 38 came from rural districts, 68 from urban (the residences of four were not known). As regards aetiology the authors divide their cases into four groups: (1) Endemic pellagra, due primarily to defective alimentation, 29 patients, 15 of them from rural districts, and 14 of these were women. (2) Alcoholism, 60 cases, all in men, 13 rural [not 113 as stated] and 44 urban, three not determined. (3) Secondary to organic disease, 12 patients, three of them women. The primary or associated conditions were pulmonary tuberculosis, cirrhosis of the liver, cancer or some lesion of the alimentary tract other than pellagra. (4) Mixed,

nine patients, all men. By " mixed " the authors imply the coexistence of pellagra with alcoholism or some organic disease [the distinction from group 3 is not clear].

There were 29 deaths among the 110 ; three in group 1, 14 in group 2. In three of these pellagra was not believed to play any part in bringing about the fatal issue, for one died of haemorrhage due to hepatic cirrhosis, and in the other two the pellagral symptoms had disappeared entirely. There were six deaths in each of the other two groups. Of these five had cancer, one the ano-rectal syndrome of lymphogranuloma inguinale, others had pulmonary tuberculosis, multiple liver abscesses or chronic colitis.

As regards age, 14 were in their third decade, 30 in the fourth, 29 in the fifth, 24 in the sixth, 10 in the seventh, and three in the eighth. Patients came to hospital much more in the hot months : November 15, December 20, January 16, February 14, that is 65 (59 per cent.) of the total in these four months. The clinical picture is described but does not depart from the known characters. Gastroscopy was carried out in 44 cases and in 38 there was gastritis, atrophic in many. Twenty-three were tested for porphyrinuria and this was present in 19 in amounts far in excess of the normal. *H. Harold Scott.*

KRUSE (H. D.). **The Lingual Manifestations of Aniacinosis, with Especial Consideration of the Detection of Early Changes by Biomicroscopy.**—*Milbank Memorial Fund Quarterly.* 1942. July. Vol. 20. No. 3. pp. 262–289. [62 refs.] [Summary appears also in *Bulletin of Hygiene.*]

This is a preliminary report of observations of the tongue changes in aniacinosis (nicotinic acid deficiency) as seen naked-eye and with the biomicroscope. Forty-nine adults, none of whom regarded himself as sick, of varied races and from a low-income group, were examined. All had gross or microscopic lingual lesions characteristic of aniacinosis and detailed descriptions of the various stages are given. In the evolution and recession of its specific lesions there is a likeness to the behaviour of the lesions in avitaminoses A and C, and in ariboflavinosis ; all four diseases reflect a definite biological pattern. The process, whether acute or chronic, mild or severe, follows precise stages. An acute process is often superimposed on a chronic one. A system has been devised by the author, of appraising the condition of the tongue in aniacinosis, which takes into account the form, intensity and stage of the pathological process. After oral nicotinamide therapy (200 mgm. daily for 14 months) to 15 of the patients, the lesions in three have almost disappeared, while the initially more severe lesions of the remaining 12 are markedly regressing. The control groups, receiving either 500 mgm. of ascorbic acid or 100,000 I.U. of vitamin A, showed no improvement. The long period required for complete recovery is a striking feature. It is concluded that the described method of examination of the tongue is a convenient and reliable method of detecting aniacinosis. *H. N. Green.*

HELLWIG (C. Alexander) & FORMAN (Louis H.). **Pellagra and Internal Secretions.**—*Amer. Jl. Clin. Path.* 1942. Apr. Vol. 12. No. 4. pp. 210–217. With 2 figs. [16 refs.]

A detailed description is given of the autopsy findings in a rapidly progressive case of pellagra in a 38-year-old coloured female. Attention

is drawn to the adrenal glands, which displayed atrophy of the zona glomerulosa and complete loss of lipoid in the cortex. The anterior lobe of the hypophysis was also atrophied, while in the pancreas the islands of Langerhans were hypertrophied.

Previous published necropsy findings of atrophic adrenal changes in pellagra are reviewed, and it is concluded that the available evidence suggests a relationship between the pellagra-preventing vitamin and the hormone of the adrenal cortex. *L. J. Davis.*

SPRUE.

HANES (Frederic M.). **Diagnostic Criteria and Resistance to Therapy in the Sprue Syndrome.**—*Amer. Jl. Med. Sci.* 1942. Sept. Vol. 204. No. 3. pp. 436–443.

This article is of the nature of a clinical lecture, and a very good one. The author begins by stating categorically the chief features of the sprue syndrome, under which head he includes coeliac disease and sprue, tropical and non-tropical. The features on which he relies for diagnosis are: (1) Steatorrhoea, the dried stool containing up to nearly 50 per cent. of fat [he does not mention anything as regards the relative amounts of neutral fats and fatty acids, on which reliance used to be placed]. (2) Loss of weight. (3) Low glucose tolerance curve; a rise of less than 40 mgm. per 100 cc. of blood after taking 1 gm. of glucose per kilo. body-weight. (4) Anaemia of the macrocytic hyperchromic type. (5) Hypo- or achlorhydria (in 70–80 per cent. of cases). Other symptoms mentioned but not stressed are the stomatitis and glossitis, meteorism, etc. On these criteria diagnosis may have to be made from pernicious anaemia, multiple avitaminoses, pancreatic disease, anorexia nervosa, tabes mesenterica, gastro-colic fistula and Simmonds's disease.

The author then quotes four cases in patients who, in spite of intensive treatment along the lines usually attended with marked success, failed to respond. No cause could be found for this lack of response. One patient improved and relapsed, the other three died. Although post mortem examinations were carried out on two of these, no satisfactory explanation of the proximate cause of death was discovered. *H. Harold Scott.*

RODRIGUEZ OLLEROS (A.). **Gastric Similarities and Differences between Tropical Sprue and Pernicious Anemia.**—*Amer. Jl. Digestive Dis.* 1942. Aug. Vol. 9. No. 8. pp. 261–264. [29 refs.]

See this *Bulletin*, 1942, Vol. 39, pp. 480, 715.

HAEMATOLOGY.

BHAVE (P. D.) & BOPAIYA (M. S.). **Diet Surveys and Investigations of Haemoglobin Levels in Coorg.**—*Indian Jl. Med. Res.* 1942. Jan. Vol. 30. No. 1. pp. 53–59.

Coorg province lies to the west of Mysore in Southern India; it is an unhealthy area owing to the prevalence of malnutrition, of malaria

and of ankylostomiasis. In 1940 the authors undertook a dietary survey in Mercara, the principal town, and the villages of Kadagadal and Igodulu. In all three the diets were those usual for poor rice-eaters in India. The rice is eaten raw or parboiled, in which much of the pericarp is retained. Pork and fish are also taken, but the amount of flesh food consumed is small. Among school-children nutrition was poor and underweight general; 38 per cent. showed phrynoderma, 7 per cent. angular stomatitis. Both the children and the adults showed obvious anaemia; of 455 children examined nearly half (204, or 44·8 per cent.) had enlarged spleens and in some villages the spleen rate was 79 per cent. Haemoglobin estimation of several groups of children was made, the Hellige instrument being used, and the findings are given in grammes per cent. Among 302 children in three Mercara schools the average of haemoglobin was 10·6 gm. per cent.; in a group of 60 at Madapur it was 9·67 gm. Ferrous sulphate tablets, 2·5 grains each, were given, two daily on 40 days in two months, to 96 children in a Mercara school, 91 in another school being observed as controls. Thirty-two in the former and 28 in the latter had enlarged spleens. At the beginning of the experiment the average haemoglobin was 10·63 and 10·59 gm. respectively, and at the end 11·2 and 10·4 gm., *i.e.* the one had gained 0·6 gm., while the other lost 0·2 gm. To another group, of 22, four tablets were given, 23 others acting as controls. The Hb at the beginning was 9·6 and 9·7 respectively, at the end 10·82 and 9·98 respectively—gains of 1·1 and 0·3 gm.

The haemoglobin was also estimated in 150 pregnant women nearing term. Their average was 8·16 gm. per cent., whereas of 38 non-pregnant women it was 10·13 gm. Fifty-two of the former had a value below 7·7 gm., which NAPIER regards as indicating anaemia in pregnant women; in 23 it was below 5 gm. There were fewer cases of severe anaemia among primiparae than among multiparae; five out of 34 primiparae, 16 of 33 2-para, 10 of 19 3-para, 14 of 34 4-para, and 8 of 30 5- or 6-para were anaemic. *H. Harold Scott.*

DE MENDONÇA (João Maia). Meniscocitemia—sua frequência no Brasil. Primeiros resultados calcados em 1,045 pesquisas. [**Sickle-Cell Anaemia; Its Frequency in Brazil.**]—*Brasil-Medico.* 1942. Aug. 8. Vol. 56. No. 32. pp. 382–384. With 2 figs.

Facts calling for explanation in this condition are: (1) Its almost complete restriction to negroes. (2) Its being a constitutional defect—hereditary and familial. (3) Its rôle in causing anaemia. (4) Its existence in some persons in a latent form, not associated with anaemia. (5) Factors which transform a "sickle-cell carrier" into a case of "meniscocythaemia," that is a person with the condition in the latent state into one with genuine sickle-cell anaemia.

The first only of these points is dealt with in this contribution. The author examined 1,043 persons [not 1,045 as stated in the title and in the text], mostly soldiers round about the age of 20 years. Of these, 604 were whites (but inquiry discovered some admixture of negro blood in nearly all of them), 33 yellow-skinned, 238 half-castes (faiodermos) and 168 blacks. Among the first there were six positive (0·99 per cent.); among the second none. The third group was divided into three according as the pigmentation was slight, moderate or marked. Of 127 in the first sub-section three were positive, of 84 in the second there were eight, and of 27 in the third two, altogether 13 among the

238, or 6·43 per cent. The fourth group was similarly divided according to the degree of pigmentation, and the respective numbers were 28, 61 and 79, and the positives 2, 6 and 9, or 17 among 168 (9·4 per cent.). Percentages on these small figures are, of course, not reliable as applying to larger numbers, but they do serve to indicate the increase as the pigmentation deepens to the full negro type, namely 7·1, 9·8 and 11·3 in the slight, moderate and marked respectively. These details are shown in the accompanying table.

	No. examined	Sickle-celled	Percentage	Percentage of group
White-skinned	604	6	0·99	—
Yellow-skinned	33	0	—	—
Half-castes—				
Slight	127	3	2·4	
Moderate	84	8	9·5	6·43
Marked	27	2	7·4	
Blacks—				
Slight	28	2	7·1	
Moderate	61	6	9·8	9·4
Marked	79	9	11·3	

H. Harold Scott.

VENOMS AND ANTIVENENES.

CHOWHAN (J. S.). **The Rôle of Venom Therapy in Chronic Painful Conditions.**—*Jl. Indian Med. Assoc.* 1942. Aug. Vol. 11. No. 11. pp. 343–347. [13 refs.]

The author has been studying systematically since 1929 the pharmacological actions of the snake venoms of India and, either alone or with his fellow-workers, has from time to time reported the results of his investigations. The pain-relieving action is due to the neurotoxic constituent present in all venoms, but preponderating in that of the cobra. Its action is to depress the medullary and psychic centres, to paralyse nerve end-plates and to stimulate the choline-esterase enzyme. In reduced doses it will, therefore, depress the higher centres and may be used for delirious states, hallucinations, melancholia and hysteria and as an anticonvulsant it relieves chorea and painful contractures, and is useful, consequently, in epilepsy. The analgesia following its use is central in origin, thus resembling that of morphine. The latter, however, exerts its effects in a very short time (10–20 minutes), persists for a few hours only, and then rapidly fades. Venoms, on the other hand, act slowly and several injections are needed, but the effects may persist for weeks.

It is thought that this analgesic action of venom may be due to its supplementing the choline-esterase enzyme which " counteracts acetylcholine, the biochemical transmitter of nerve impulses " ; possibly the

venom acts as the enzyme and need not merely supplement it. A further advantage over other analgesics is that venom does not produce tolerance or lead to addiction or habit-formation.

For comparison with other analgesics—sodium salicylate, sodium phenobarbital, cocaine hydrochloride, antipyrin, acetanilide, dilaudid, codeine hydrochloride and morphine sulphate—the author made use of the "rat scrotum sensibility test," and found that cobra venom in doses of 1–2 mouse units (a mouse unit is the amount of venom which will kill a 20 gm. weight of white mouse in 24 hours) is the best slowly acting analgesic, and that a dose of 1 m.u. is the optimum initial therapeutic dose for man. It is injected intramuscularly 2–3 times a week, increasing gradually to 10–20 m.u. doses. As it is slow to act, others more rapid in action, such as amidopyrin, novalgin, opiates or salicylates, may be used to control pain in the earlier stages in cases of neuritis, neuralgia, sciatica, fibromyositis, tic doloureux, arthritis and the like. *H. Harold Scott.*

NAIDENOVA (G. A.) & TALYSIN (F. F.). **On Studying the Haemorrhagic Properties of the Venom of the** *Ancistrodon blomhoffi ussuriensis* **Emeljanoff in the Chicken's Embryo.**—*Travaux Acad. Milit. Méd. Armée Rouge U.R.S.S.* Moscow. 1941. Vol. 25. [In Russian pp. 399–402. With 1 chart & 1 coloured plate. English summary pp. 402–403.]

MEDNIKIAN (G. A.). **On the Pharmacological Properties of the Venom of the Species** *Ancistrodon halys caraganus* **(Eichwald).**—*Travaux Acad. Milit. Méd. Armée Rouge U.R.S.S.* Moscow. 1941. Vol. 25. [In Russian pp. 417–427. With 9 figs. (14 refs.) English summary pp. 427–428.]

DERMATOLOGY AND FUNGOUS DISEASES.

RAY (Leon F.) & ROCKWOOD (Ethel M.). **Sporotrichosis. Report of a Case in which it was Resistant to Treatment.**—*Arch. Dermat. & Syph.* 1942. Aug. Vol. 46. No. 2. pp. 211–217. With 4 figs. [13 refs.]

Here is reported the sixth proven case to be detected in New England. The disease is so protean in nature that demonstration of the organism is really essential to the diagnosis. This particular patient was a white woman aged 65 years. The first signs of eruption had developed about twelve months earlier as a spot on the right little finger. Thereafter gradual spread involved the forearm and arm, so that examination revealed a sheeted patch over the distal third of the right forearm with wrapping round the wrist. Dusky erythema was combined with verrucous, crusted and fungating circular areas. A thick white pus could be extruded from pin-point sinuses. The most striking feature, however, was the presence of numerous infiltrated dark red granulomatous nodules scattered discretely but all roughly following the linear course of the lymphatics. The axillary glands were enlarged

to the size of walnuts, were tender and fluctuant but were still separate and distinct. The X-rays revealed some decalcification of the bones of the forearm. Both histological and cultural specimens proved the causative organism to be *Sporotrichum schencki*. The photographs of these preparations are excellent. All forms of treatment proved to be quite unavailing, including the administration of large doses of potassium iodide, the inhalation of ethyl iodide, iodine and sodium iodide intravenously, and radiotherapy. *Sydney Thomson.*

COUTINHO (Alcedo) & RUSSO (Egydio). Um caso de espirotrichose por *Sporotrichum schencki*. [**A Case of Sporotrichosis due to** *S. schencki*.]—*Brasil-Medico.* 1942. Sept. 5. Vol. 56. No. 36. pp. 419–420. With 3 figs.

Infection by *S. schencki* is much rarer than that by *S. beurmanni*. In the present case a woman of 58 years of age, in the course of her domestic duties, scalded her right thumb. She also " thought she had pricked herself [on the thumb ?] with a rose thorn " when tending her garden. Forty-eight hours later a small abscess developed at the root of the nail and five days later there was swelling in front of the elbow and the lymphatics along the arm became inflamed. In the course of a fortnight a chain of painless nodules, 14 in number, appeared which slowly ulcerated and discharged blood and a little pus. She had no fever. Cultivation of the discharge yielded growth of *S. schencki*. Treatment with 10 per cent. sodium iodide, 10 cc. intravenously, and the local application of metaphen soon brought about a cure. The differences between *S. schencki* and *S. beurmanni* on culture are quoted from the text-books to show that the lesions in the present case were associated with the former. *H. Harold Scott.*

PARDO-CASTELLO (V.), LEON (E. Rio) & TRESPALACIOS (F.). **Chromoblastomycosis in Cuba.**—*Arch. Dermat. & Syph.* 1942. Jan. Vol. 45. No. 1. pp. 19–31. With 6 figs.

It is stressed that chromoblastomycosis is the only example of the " blastomycosis group " which has been identified in Cuba. Gilchrist's disease, torulosis, coccidioidal granuloma, etc., are all unknown. Of the 31 cases reported each can be placed in one of five distinct clinical types. There are those which are dominantly verrucous and papillomatous. The second group contains those which may be described as tuberculoid or sarcoid. Syphilis is imitated in that syphiloid type which resembles late gyrate cutaneous gummata. Fourthly there are those cases which are dominantly psoriasiform, and lastly the cicatricial and elephantiasic forms. These variations are the consequence of different tissue reactions, for instance, the allergic reactivity of the patient. The fungus *Hormodendron pedrosoi* was recovered in 11 cases. The differential diagnosis is discussed fully but is outlined by the descriptions of the types. Diagnosis really rests on the finding of the typical yellow or brown round cells in the scales, pus or in a section of tissue. In this last they may be seen situated within giant cells or small abscesses. The treatment of choice for the superficial forms is intensive radiotherapy. Where the condition is more extensive or more infiltrated electro-coagulation is recommended.

Sydney Thomson.

JAMIESON (Robert C.) & MCCREA (Adelia). **Ringworm of the Feet: Shoes and Slippers as a Source of Re-infection. Final Report.**—*Arch. Dermat. & Syph.* 1941. Nov. Vol. 44. No. 5. pp. 837–844.

"This study reveals that a fairly large proportion of persons with fungous infections of the feet are able to contaminate the shoes they wear .... Although recurrences are the rule when the fungus is once thoroughly established in the skin of the feet and toes, these recurrences take place over varying periods during which many new shoes are worn, but in all probability, bedroom slippers are unchanged. If an actual reinfection occurred it would more likely be due to the slipper than to the shoe." All the patients reviewed in this series had a mild dermatitis with recurring manifestations except for two in whom the dermatophytosis was rather severe. The feet only were affected, two-thirds of the patients were males, various types of occupation were represented and the age limits were 4 and 66 years. In the examination of the shoes for parasitic fungi of the skin, 40 per cent. gave definitely positive results and 34 per cent. gave doubtful findings. The most common pathogenic fungus proved to be *Trichophyton interdigitale.* In some 52 samples there were found such suspected pathogens as Monilia. Non-pathogenic fungi were detected in 142 samples, Aspergillus and Penicillium being dominant. The findings were, of course, often mixed and 68 cases actually showed a multiplicity of organisms of all types. Good prophylactic results were obtained by MAGEE and HARTFIEL, who recommended dusting the feet and shoes with a powder composed of hydroxyquinoline, sodium perborate, sodium borate, boric acid and aluminium silicate. Rubber slippers should be used in swimming pools, etc.; and these may be frequently sterilized by formaldehyde gas. Certain fungicides could be incorporated in leather insoles and even in all new shoes and slippers, a suggestion first made by SELDOWITZ. *Sydney Thomson.*

DEY (N. C.) & MAPLESTONE (P. A.). **Tinea Imbricata in India.**—*Indian Med. Gaz.* 1942. Jan. Vol. 77. No. 1. pp. 5–6. With 2 figs. on plate.

"The identity of all the species of *Endodermophyton* causing tinea imbricata in the eastern hemisphere is confirmed and attention is drawn to the possibility that this disease is commoner in India than is now recognized."

ARNOLD (Harry L.), Jr. **Dermatitis due to the Blossom of *Grevillea banksii*: a Newly Recognized and Common Entity in Hawaii.**—*Arch. Dermat. & Syph.* 1942. June. Vol. 45. No. 6. pp. 1037–1051. With 7 figs. (1 coloured). [14 refs.]

In Hawaii there is a common flower known locally as the kahili or rain flower. This plant is the commonest cause of a typical dermatitis venenata but it is remarkable in that the antigenic material is found only in the blossoms and not in the leaves. It is present in the calyx, anthers and style of both the red and yellow varieties of the flower. This shrub may attain a height of eight or ten feet and it is interesting that it was first introduced into the islands from Australia. The skin changes are of the usual vesicular type and arise at the site of

contact. The incubation is two or three days. The rash never appears within 24 hours. A paper which is most careful both clinically and in its extensive botanical observations.

Sydney Thomson.

ALEMANY VALL (R.) & CASTELLS ESCUDER (A.). Un caso de dermitis necrótica por el populus nigra y revelada por la acción de los rayos solares. [**Necrotic Dermatitis due to the Black Poplar Sawdust induced by the Rays of the Sun.**]—*Rev. Clín. Española.* 1942. Mar. 15. Vol. 4. No. 5. pp. 353–356. With 3 figs. [16 refs.]

This is a most unusual case. A man of 45 years was employed for two months or so in sawing trees, in particular the *chopo*, or Black Poplar (*Populus nigra*). At his work, at which he had sweated more than usual, he had felt some itching of the face, and this increased during the night. Next day he had left the house only five minutes or so when he felt a pricking of the left hand and the eyelids. This was accompanied by a burning sensation and extended from hand to forearm and from face to neck; the lids swelled till the eyes were closed. There was oedema of the neck, petechiae of face and neck, and oedema of the hands and forearms, especially the left. Systemic disturbance was comparatively little. During the next 4–5 days the lesions became worse and pustulated; then they began to heal by formation of ulcers and separation of scabs, but 10 weeks elapsed before healing was complete. The left side was more affected than the right because in his work he turned that side to the sawdust which was blowing into his face during the eight hours he was at work.

The remainder of the paper is taken up with the question of diagnosis. [As with many articles in Spanish this section is mostly theoretical. For instance, in the present case one is not likely to confuse an acute inflammatory, pustulating lesion of the face and hands with angeio-neurotic oedema, with sun-bathing, with menopausal symptoms (especially when the patient is a man, even though his age is 45), with nettlerash from eating lobsters, with "war melanosis," erythema multiforme, all of which are considered in the discussion of the diagnosis of this patient's case.]

H. Harold Scott.

DUBOIS (A.) & BRUYNSEELS (G.). Coup d'oeil sur les affections cutanées des indigènes congolais. [**Skin Diseases in Natives of the Belgian Congo.**]—*Ann. Soc. Belge de Méd. Trop.* 1941. Dec. 31. Vol. 21. No. 4. pp. 311–337. [47 refs.]

HOLCOMB (Richmond C.). **Pinta, a Treponematosis. A Review of Literature.**—*U. S. Nav. Med. Bull.* 1942. July. Vol. 40. No. 3. pp. 517–552. [177 refs.]

SIMSON (F. W.) & BARNETSON (J.). **Histoplasmosis: Report of a Case.** —*Jl. Path. & Bact.* 1942. July. Vol. 54. No. 3. pp. 299–305. With 9 figs. on 3 plates. [30 refs.]

The case reported is that of a European male who was admitted to the Johannesburg General Hospital. He was suffering from a number of lesions of a nodular or ulcerative character on the tongue, gums and lips. There was enlargement of the liver and spleen, while the cervical lymph nodes were palpable. Blood examined revealed a leucopenia

with a relative polynuclear increase. There was no fever during a 12-day stay in hospital. Portions of lesions of the tongue were sectioned and showed infiltration with reticulo-endothelial cells, many of which contained yeast-like bodies. Growth of the organism was obtained at laboratory temperature on dextrose and maltagar with mycelium and chlamydospore formation. Satisfactory infection of laboratory animals, though attempted, was not obtained.

C. M. Wenyon.

KEY (J. A.) & LARGE (A. M.). **Histoplasmosis of the Knee.**—*Jl. Bone & Joint Surgery.* 1942. Apr. Vol. 24. No. 2. pp. 281–290. With 7 figs.

The case reported is that of a man who was admitted to hospital in St. Louis, U.S.A., for a chronic and painful swelling of the left knee. Examination showed that the joint was full of fluid which on aspiration proved to be thick purulent material. There was considerable thickening of the synovial membrane, while X-ray examination revealed erosion of the bones. It was thought that the condition was due to a low grade pyogenic infection or to fulminating tuberculosis. Treatment brought about no improvement. Finally the limb was amputated, the patient dying 10 days later from a pneumonic condition of the lungs. Examination of the affected knee showed general invasion of the tissues by large mononuclear cells containing numerous *Histoplasma capsulatum.* The exact nature of the lung condition was not determined, as a post-mortem examination was not permitted.

C. M. Wenyon.

BOASE (A. J.). [**Case of Rhinosporidiosis in a Native of Uganda.**] [Correspondence.]—*East African Med. Jl.* 1941. Dec. Vol. 18. No. 9. p. 270.

Boase reports a case of rhinosporidiosis of the conjunctiva in a child in Uganda. There was a flattened flesh growth protruding from beneath the upper eyelid and attached to the upper fornix by a very narrow pedicle of stretched conjunctiva. In colour the tumour was "congested" red with uniform pin-head grey mottling. Diagnosis was made microscopically.

C. W.

MISCELLANEOUS.

PLATEL (G.) & VANDERGOTEN (Yv.). Réflexions sur les résultats obtenus par une consultation de nourrissons au Mayombe (Congo belge). [**A Consideration of the Results Obtained in Child Welfare Work at Mayombe (Belgian Congo).**]—*Ann. Soc. Belge de Méd. Trop.* 1940. Sept. 30. Vol. 20. No. 3. pp. 297–333. [12 refs.]

For six years the authors have been engaged in child welfare work in the Mayombe district of the Belgian Congo. In this paper they provide a detailed account of their work and summarize the results obtained. The causes of child mortality are discussed and the conclusions reached as a result of an objective study of the problems are set out.

The weights of Congo children were found to be considerably less than those of children in Belgium ; for example, at birth 550 grammes, at six months 1,400 grammes, and at two years 3,000 grammes less.

The causes of stillbirths and neo-natal deaths were difficult to ascertain accurately. As regards stillbirths, syphilis was considered to be rare, congenital malformations not especially frequent, and malaria negligible. Obstetrical causes were more frequent than in Belgium owing to the lack of skilled attention. As to neo-natal mortality, malaria was not considered of importance but broncho-pneumonia and malnutrition were serious, the first as a result of a native custom of leaving the child exposed until the cord had separated, the second owing to the difficulty of obtaining substitute food when the mother's milk was absent or deficient.

Of the mortality from the second month up to three years of age, acute affections of the respiratory tract caused 50 to 60 per cent. of the total deaths, and gastro-enteritis 10 to 23 per cent. Malaria, though hyperendemic in the district and widespread among the children, was not considered to be a major factor.

A large part of the paper consists of a critical examination of the statistics which had been published by the Foréami organization and of the conclusions which had been drawn from them.

The authors' own conclusions are as follows : In child welfare, diet and individual hygiene play a fundamental part. But advice on hygiene can seldom be followed by native mothers, who find it often impossible to obtain soap, pure water, necessary clothing, and cooking requisites. Milk and substitute foods for infant feeding are beyond the means of all but a few.

A study of the causes of the mortality and of the means of combating them shows that infant welfare clinics, however well equipped and run, though they can lessen the sickness and suffering of infants, cannot, by themselves, have such a decisive influence as certain statistics would appear to show.

As to those rural clinics in which the work is limited simply to weighing the baby and giving advice, it is questioned whether, in the present state of the colonial medical service, the results justify the considerable expense which they entail. *Mary Blacklock.*

TROLLI (G.). A propos du travail : Réflexions sur les résultats obtenus par une consultation de nourrissons au Mayumbe (Congo Belge) par les Docteurs Platel et Vandergoten. [**Remarks on the Paper by Platel and Vandergoten (above).**]—*Ann. Soc. Belge de Méd. Trop.* 1940. Sept. 30. Vol. 20. No. 3. pp. 371–382.

Dr. Trolli replies in detail to the various criticisms of Foréami made in the above paper.

As regards the figures for stillbirths, he points out some of the difficulties encountered not only in collecting such statistics in the Congo but also in making a comparison of them with those from other countries. He shows that, even in Europe, there is not yet agreement as to what should be described as a stillbirth. Even in Europe still-births and abortions are often confounded and this naturally happens more frequently in the Congo.

The author emphasizes that Foréami has never published statistics of child mortality in a spirit other than that of getting as close to

reality as possible. He is convinced that infant welfare clinics constitute the best weapon in the struggle against infant mortality in spite of faults of organization and lack of material means at their disposal, and gives figures comparing vital statistics in Belgium and Bas Congo in support of his arguments. *Mary Blacklock.*

DENECKE (Karl). Studien ueber die inneren Krankheiten und deren Verlauf in einem westafrikanischen Hospital. [**Internal Diseases seen in a West African Hospital.**]—*Deut. Trop. Ztschr.* 1941. Oct. 15. Vol. 45. No. 20. pp. 609–620. [11 refs.]

This is an account of diseases seen by the author in Fernando Po. It does not differ greatly from the record reviewed in this *Bulletin*, 1942, Vol. 39, p. 348. *C. W.*

KERMACK (William O.). **Some Recent Advances in Chemotherapy.**—*Edinburgh Med. Jl.* 1942. July. Vol. 49. No. 7. pp. 429–457. With 35 figs. [35 refs.]

This is a review article containing an account of the synthetic antimalarial drugs, the trypanocidal drugs, including the aromatic diamidines and the sulphonamides. *C. W.*

SORICELLI (Filippo). Quadri radiologici della tubercolosi polmonare negli Eritrei. [**X-ray Appearances in Pulmonary Tuberculosis of Eritrean Natives.**]—*Boll. d. Soc. Italiana di Med. e Igiene Trop.* (Sez. Eritrea.) Asmara. 1942. Vol. 1. No. 2. pp. 27–33. [12 refs.] English summary.

JAGUJINSKAIA (L. W.). Présence d'une membrane péritrophique dans l'estomac de la femelle adulte d'Anopheles maculipennis. [**Presence of a Peritrophic Membrane in the Stomach of Female** *A. maculipennis.*]—*Med. Parasit. & Parasitic Dis.* Moscow. 1940. Vol. 9. No. 6. [In Russian pp. 601–602. With 2 figs. French summary (8 lines) p. 603.]

It is usually stated that the adult mosquito has no peritrophic membrane. There is, however, an exceedingly delicate pellicle between the blood and the stomach wall and the author claims that this is composed of chitin (like the peritrophic membrane of other insects) and that it is in fact a true peritrophic membrane. This sheath is formed anew at each feed and the remnants discharged through the anus. It may form a complete sac around the blood, but is often open posteriorly. It is absent in the unfed or newly emerged mosquito.
V. B. Wigglesworth.

SOUTH AFRICAN INSTITUTE FOR MEDICAL RESEARCH. ANNUAL REPORT FOR YEAR ENDED 31st DECEMBER, 1941 [CLUVER (E H.), Director].—pp. 18–20. **Mosquito Repellents.**

Laboratory experiments, with *Aëdes aegypti*, in which a number of repellents were tested, showed that the following solution, when applied

to the arm, maintained a repellent action for 3–4 hours, and when sprayed on to a guineapig, repelled for 5 hours :—

Citronella	88	parts
Coumarin	7	,,
Gum benzoin	5	,,

There is no irritating action on the skin and the smell is not objectionable. Coumarin, as a 20 per cent. solution in spirit, or in the same strength in "Cellosolve" (ethylene glycol monoethyl ether) was equally effective.

A repellent must be applied thoroughly to all exposed parts of the body ; it is more effective in cold than in hot weather, probably because of dilution by sweat in the heat. These laboratory experiments could not reproduce the conditions existing in nature and it remains to be seen if the repellents are active in the field. *C. W.*

SERGENT (Et.). Sur l'action culicifuge de certains produits. [**Mosquito Repellents.**]—*Arch. Inst. Pasteur Algérie.* 1940. Vol. 18. No. 4. pp. 461–463. [Summary taken from *Rev. Applied Entom.* Ser. B. 1942. Oct. Vol. 30. Pt. 10. pp. 150–151.]

In experiments to determine the value as mosquito repellents of a mixture of six parts oil of eucalyptus, three parts oil of citronella and one part naphthalene, which is stated to be commonly used against lice, and an extract of the leaves of *Melia azedarach*, which is used against locusts, 2,332 adults of *Aëdes aegypti*, L., *Anopheles maculipennis* var. *labranchiae*, Flni., and *Culex pipiens*, L., were used. Of these, 1,175 bit twice. A hand was exposed for five minutes to mosquitos that had been kept without food for several days and was withdrawn before they could engorge. It was then smeared with the product to be tested and exposed for a further five minutes to the mosquitos after varying intervals. The numbers of mosquitos that bit on the first and second occasions were compared. The effect of each of the components of the mixture on each species of mosquito was analogous with that of the mixture itself. The latter began to lose its repellent effect to *Aëdes aegypti* after about 30 minutes and had lost it completely at the end of 90 minutes. The repellent effect to *A. m. labranchiae* began to decrease after one hour but was still apparent after four, while that to *C. pipiens* began to decrease in some instances after 30 minutes but in others was still apparent after nine hours. The effect of the extract of *M. azedarach* was so weak that it is considered to offer no promise as a mosquito repellent.

DE MEILLON (Botha). Estudos entomológicos da colónia de Moçambique. [**Entomological Studies in Mozambique.**]—315 pp. With numerous illustrations & 2 folding maps. 1941. Lourenço Marques: Estação Anti-Malárica. [Imprensa Nacional de Moçambique.] Guia para a identificação dos anofelinos da Colónia de Moçambique, com notas acêrca dos seus hábitos e lugares de criação. pp. 137–313. With 77 figs. [42 refs.]

JELLISON (Wm. L.) & GOOD (Newell E.). **Index to the Literature of Siphonaptera of North America.**—*Nat. Inst. Health Bull. No. 178.* Washington. 1942. 193 pp. [Bibliography.]

LUCAS (Thomas L.). **Poisoning by Megalopyge Opercularis ("Puss Caterpillar").**—*Jl. Amer. Med. Assoc.* 1942. July 11. Vol. 119. No. 11. pp. 877–880. With 6 figs.

The moth is found in the Southern United States. The larvae of this and similar moths are equipped with straight, sharp, hollow spines, filled with a fluid which presumably causes the symptoms which arise after penetration of the human skin by these spines. The author describes one case seen by himself and three recorded in the literature. After contact of the skin with the larva there develops, within a few minutes, pain, burning and itching, with erythema and vesiculation, rather like the symptoms experienced after contact with nettle. General symptoms also occur, and may be severe, with excitement, alarm and restlessness, headache and muscle cramps. Symptoms may be relieved by the use of codeine or even of adrenalin; they disappear after about 12 hours. The area of the injury heals much as a burn of the first degree heals. [See also this *Bulletin*, 1923, Vol. 20, p. 801; 1937, Vol. 34, p. 733.]

SMITH (Clarence D.) & ROSENBERGER (Randle C.). **A Case of Cutaneous Myiasis due to the Larvae of** *Cordylobia anthropophaga*.—*Amer. Jl. Trop. Med.* 1942. July. Vol. 22. No. 4. pp. 459–461. With 3 figs.

GLAUBACH (Nathan) & GULLER (E. J.). **Pneumonia apparently due to** *Trichomonas buccalis*.—*Jl. Amer. Med. Assoc.* 1942. Sept. 26. Vol. 120. No. 4. pp. 280–281.

The patient was admitted to hospital with signs and symptoms of left lower lobar pneumonia. The cough was productive of a white frothy phlegm with complete absence of blood. Bacteriological examination of the sputum failed to reveal any pneumococcal infection but microscopic examination disclosed many trichomonas. Examination of scrapings from the gums and around the teeth, which revealed an advanced pyorrhoea, did not show any of the flagellates. Faecal examination was likewise negative for trichomonas, though amoebae containing red blood corpuscles were discovered. There was no history of dysentery. Treatment of the pneumonic condition with sulphadiazine had been commenced early on and this was continued. As recovery took place the flagellates became less numerous and finally disappeared. The amoebic infection was eradicated by a course of carbarsone. It is admitted that it cannot be stated whether the trichomonas was the cause of the lung condition or whether it was merely a secondary invader. *C. M. Wenyon.*

AHMAD (Dabiruddin). **Determination of the Age in Bengali Girls in Medico-Legal Cases—Some Practical Difficulties. The Rôle of X-Ray Examinations of Bones.**—*Indian Med. Gaz.* 1942. June. Vol. 77. No. 6. pp. 351–355.

In this paper the author reviews the methods commonly used for the determination of age. The two most important are the examination of the teeth and the X-ray examination of the bones. No method is infallible, and great variations exist from case to case. Two tables

are given which may be helpful, but it is emphasized that account must be taken of all factors, general development, height, weight and signs of puberty.

Permanent Teeth	*Age*
1. First molar... ...	6 years
2. Central incisors ...	7 ,,
3. Lateral incisors ...	8 ,,
4. Anterior bicuspid ...	9 (9–10)
5. Posterior bicuspid...	10 (10–12)
6. Canine	11 (11–12, rarely 13)
7. Second molar ...	12 (12–13)
8. Third molar ...	17–25 (generally about 18)

Bones

Name of bone	Part of bone	Fusion of the Epiphyses		
		Earliest	Average	Latest
Humerus ...	Upper end	14	14–16	18
	Lower end	11	12–13	14
Radius ...	Upper end	12	14	15
	Lower end	12	16–17	18
Ulna	Upper end	12	15	16
	Lower end	14	16–17	18
Carpal bones	Capitate 6 months			
	Hamate 8 to 14 months			
	Triquetrum 2 to 3 years			
	Lunate 5 years			
	Multangular majus 5 to 6 years			
	Scaphoid 6 years			
	Pisiform 9 to 12 years			
Metacarpals...	1st	13	14–16	18
	2nd to the 5th		14–15	

[See also this *Bulletin*, 1938, Vol. 35, p. 927.] *C. W.*

BOOK REVIEW.

BARRETO (João de Barros). **As realizações em 1941 do Departamento Nacional de Saude.** [Report of the Department of Health, Brazil, for 1941.]—*Arquivos de Higiene.* Rio de Janeiro. 1942. Apr. Vol. 12. No. 1. pp. 7–301. With numerous illustrations & charts.

To do justice to the vast amount of work recorded in this report for 1941 of the Department of Health and Education, Brazil, would require far more space than can be allotted to it. We must, therefore, limit our remarks to those matters which are of special interest to readers of this *Bulletin*. Part of the report is concerned with questions

of finance and administration, the former of which is entirely, the latter largely, of local rather than of general interest. Mere enumeration of the various sections will suffice to indicate the enormous scope of the work and the many fields of the Department's activities. I. Administrative Service. II. Health Organization. III. Hospital Organization. IV. The Oswaldo Cruz Institute. V. Leprosy Service. VI. Tuberculosis. VII. Yellow Fever. VIII. Malaria. IX. Plague. X. Mental Diseases. XI. Health Education. XII. Medical Treatment (personnel, supply and costs). XIII. Port Sanitation. XIV. Water Supply and Sewage Disposal. XV. Statistics. And, lastly, brief notes of seven meetings of delegates.

In the sections concerned with Administration and Organization, arrangements and proposals for future work and aims are detailed for each of the States of the Republic and the estimated cost *per caput*. The following section deals in a similar manner with hospital provision.

The report of the *Leprosy Section* gives details of the cost of maintenance of each of the sanatoria, with numerous illustrations of them and a plan of the São Benito leper colony, Ceará. During the year four more " preventoria " for the care and education of the children of lepers have been inaugurated. The leper census figures are somewhat confusing [to the reviewer, at least]. In a table are given the " census figures for 1941 " and the total is 3,638, to which São Paulo contributes 1,536, Minas Gerais 869, and Distrito Federal 270. On the next page, however, is another table giving the numbers of known patients and the numbers isolated in the different leprosaria in December 1941. The " known patients " total 32,949 (São Paulo 12,350, Minas Gerais 8,434) and the numbers isolated 15,777 (or 48 per cent. of the known cases), São Paulo with five institutions contributing 8,458 and Minas Gerais, with two institutions, 2,171. The number since the Service began its work (1937?) totals 47,772 (São Paulo, 19,599, Minas Gerais 8,426, Pará 4,552).

The aims and purposes of the leprosy campaign are set out at length, but need not be detailed here. They include, of course, the discovery of cases, isolation and treatment of them, observation of contacts, care of children, institutes for study of the disease, propaganda and education.

The *Yellow Fever Section* is comprehensive. Maps are reproduced showing the administration area of the Service, the situations of 1,296 " viscerotomy posts " and of 6,667 anti-Aëdes Service localities. Ten years ago there were only 394 of the latter and 260 of the former. During the year, 32,282 specimens of liver tissue have been examined. The good work of the campaign is evidenced by the return of positive cases of the disease confirmed by histopathological examination or " isolation of the virus " ; the figures for the past five years have been 217, 262, 130, 172 and 19. Serum tests for evidence of protection have been carried out in 8,807 cases.

Another section, equally, if not more, important, is that of *Malaria*. The President's decree of October 1st, 1941, is reproduced in full; of the 42 Articles, one—the second—is worth quotation here :—

The following measures are to be undertaken for combating malaria :

1. Work of sanitary engineering and other health measures to prevent the breeding of the insect transmitters.
2. Systematic destruction of those species of Anopheles as are of local epidemiological importance at some stage of their evolution.

3. Protection of individuals and their dwellings by chemical, mechanical and biological means.
4. Isolation and treatment of patients and carriers of gametocytes, to get rid of or, at least, reduce their infectivity.
5. Education of the people.

Several photographs are reproduced showing the developments of drainage schemes in different States and Departments of the Republic, with records of examinations made in certain districts. One example will suffice. At Val de Cans, in the Province of Pará, the larval index has been worked out month by month since October 1940. Whereas in March 1941 it was 1·5 per cent., in the last half of the year the figures were 0·72, 0·12, 0·03, 0·05, 0·04 and 0·02 respectively. Cases of infection notified in October 1940 numbered 894 and in December 174. A maximum of 472 was reached in April 1941, but in the last half of the year the figures have steadily declined from 234 in July to 98 in December.

Work done in each of the States and in various parts of each is mentioned; in many cases instructive pictures showing the drainage schemes, in progress and completed, are given.

Section XI, the *Plague Service*, reports that the plague situation in 1941 was worse than in the preceding year. One hundred and fifty-five cases were recorded in the north-east as compared with 94 in 1940 (in 1937 there were only 35). Ninety-six were in Pernambuco, 47 in Alagoas and 12 in Baia. Pernambuco and Ceará have always shown most cases. In 1934–36 the respective figures were 31 and 155, 437 and 231, 89 and 137. Since that year the figures for Pernambuco have been successively 23, 71, 33, 61 and 96, whereas Ceará has been almost free (2, 3, 3, 2, and 0 respectively) and Alagoas has taken up the running, its figures for 1937 to 1941 inclusive being 0, 6, 40, 25 and 47. The fatality rate for the whole north-east has averaged, since 1935, 38·5 per cent.; in 1941 it was 39 per cent. and in 1938 as high as 47 per cent. A projected decree to combat plague and rats is quoted *verbatim* in the report.

The numbers of rats caught, and the flea index, at six of the chief ports are given in a table. These are worth quoting: Maceió, 5,359 rats, index 10·8 in May, 1·8 in October; Santos, 11,533 rats, index 2·6 in November, 0·02 in October; Fortaleza, 15,494 rats, index 1·6 in February, 1·0 in January; Salvador 16,618 rats, index 24·1 in October, 0·05 in March; Recife, 17,884 rats, index 6·3 in March, 0·8 in September; Rio de Janeiro, 53,509 rats, index 6·5 in October 1·0 in November.

Port Sanitary work (Section XVI) has been largely concerned with, rat capture and destruction and with disinfection of vessels. The other sections named at the beginning of this review will not interest readers of the *Bulletin*, though of much local importance, such, for example, as water supplies (details of cost and upkeep of which are given for many localities in the different States), sewage installations, the Federal Statistical Service and its administration. Actual statistics of births, deaths and diseases generally are not mentioned here.

The foregoing remarks will convey some idea of the magnitude and importance of the work being carried out by the Ministry and the Health Department of Brazil. *H. Harold Scott.*

Printed under the authority of His Majesty's Stationery Office
By the South Essex Recorders, Ltd., Ilford.
(2391) Wt. P1676/260 1,725 2/43 S.E.R. Ltd. Gp. 432.

ALPHABETICAL LIST OF AUTHORS OR SOURCES

Ahmad, D., 181.
Alemany Vall, R. & Castells Escuder, A., 176.
Alessandri, H., Palazuelos, P. G. & Lerner, J., 168.
Andrews, J. C. & Webb, B. D., 158.
Arnold, H. L., Jr., 175.

Barlovatz, A., 101.
Barreto, J. de B., 182.
Barth, C., 134.
Berne, C. J., 146.
Bhave, P. D. & Bopaiya, M. S., 170
Bibikova, T. I., 143.
Boase, A. J., 177.
Bourguignon, G. C., 103.
Brahmachari, U. & Basu, C. C., 121.

Cameron, J. A. M. & Collins, J. C., 144.
Castañeda, M. R., 127, 128.
Chowhan, J. S., 172.
Cluver, E. H., 179.
Cochrane, R. G., 151.
Collignon, E., 105.
Corradetti, A., 117.
Co'Tui & Wright, A. M., 140.
Coutinho, A. & Russo, E., 174.
Coutts, W. E. & Herrera, J. M., 144
Cupi, N. & Cattapan, A., 124.

Denecke, K., 149, 179.
Dey, N. C. & Maplestone, P. A., 175.
Drenowsky, A. K., 121.
Dubois, A. & Gavrilov, W., 150.

Ferro-Luzzi, G., 135.

Garzon, R. & Molina, R. J., 125.
Girard, G., 139.
Glaubach, N. & Guller, E. J., 181
Gönnert, R., 160.
Guindy, 139.

Hanes, F. M., 170.
Headlee, W. H., 148.
—— & Cable, R. M., 148.
Hellwig, C. A. & Forman, L. H., 169
Henry, A. J. & Grindley, D. N., 122
Howard, S., 157.
Howe, C., 137.

Jagujinskaia, L. W., 179.
Jamieson, R. C. & McCrea, A., 175.

Kerger, H., 136.
Kermack, W. O., 179.
Key, J. A. & Large, A. M., 177.
Kitchen, S. F. & Putman, P., 109.
Knipe, F. W. & Russell, P. F., 115.
—— & Sitapathy, N. R., 116.
Kowalzig, 120.
Kruse, H. D., 169.
Kumm, H. W. & Zúniga, H., 108.
Kunert, H. & Buch, E., 130.

League of Nations, 126.
Lucas, T. L., 181.
Lyon, G. M., 142.

Mackay, A. G., 155.
Magath, T. B., 156.
Marchionini, A., 125.
Masse, G., 148.
de Meillon, B., 110, 111.
de Mendonça, J. M., 171.
Mendoza, L., 136 *bis*
Mogilnizky, B. N. & Brumstein, M. S., 141.
Mudrow, L., 116.
Mumford, E. P., 107.
Muñoz Rivas, G., 151.

Napier, L. E., Sen Gupta, P. C. & Sen, G. N., 121.
Nicolay, F., 104.
Niño, F. L., 145.

Otto, R. & Bickhardt, R., 129.

Panja, G., Malik, K. S. & Paul, B. M., 140.
Pardo-Castello, V., Leon, E. R. & Trespalacios, F., 174.
Perves, 155.
Platel, G. & Vandergoten, Y., 177.
Primitivo de la Quintana, 126.

Rao, R. B. & Ramoo, H., 114, 115.
Rao, S. S., 160.
Rao, V. V., 113.
Ray, J. C., Mukerjee, S. & Roy, A. N., 118.
Ray, L. F. & Rockwood, E. M., 173.
Reenstierna, J., 152.
Rigdon, R. H. & Thomas, W. K. S., 118.
Rissmann, E. F., 147.
Rockefeller Foundation, 112.
Rodhain, J., 167.
—— & Lassman, P., 119.
——, Valcke, G. & van Goidsenhoven, C., 120.
Rodriguez Olleros, A., 170.
Rossas, T. P., 150.
Roubaud, E., Chorine, V. & Guiraud, P., 109.
Roy, D. N. & Biswas, T. C., 112.
Russell, P. F. & Jacob, V. P., 105.
——, Knipe, F. W. & Rao, H. R., 114.
——, Mulligan, H. W. & Mohan, B. N., 117.

Sautet, J., 110.
Schütz, F. & Messerschmidt, T., 132.
Schwetz, J., 102, 104.
——, J. & Baumann, H., 103.
Sergent, Et., 180.
Siedek, H., 143.
Siegfried, G. & Izac, R., 105.
Simson, F. W. & Barnetson, J., 176.
Skvortzov, A. A. & Talysin, F. F., 158.
Sonnenschein, 125.
South African Institute for Medical Research Annual Report, 179.
Sutter, V. A. & Zúniga, H., 107.

Tietz & Carlé, 133.
Tomita, M., 113.
Trant, H., 154.
Trolli, G., 178.

Van den Berghe, L., 162 *ter*.
Venkataraman, K. V., 139.

Warner, B. W., 155.
Westphal, A., 144, 147.

BUREAU NOTICES.

The Director will be glad to receive early copies of works or reprints on Tropical Diseases for notice in the *Tropical Diseases Bulletin* and for the Library.

Publications of the Bureau of Hygiene and Tropical Diseases.

TROPICAL DISEASES BULLETIN

containing classified summaries of current papers and reports from the medical and scientific publications of the world on diseases of the tropics and warm countries.

(ISSUED MONTHLY.)

Subscription rate (in advance) : 21 shillings per annum post free. The subscription runs from January to December. Single numbers 2s. 6d. each.

SUPPLEMENTS TO THE TROPICAL DISEASES BULLETIN

summarizing the Annual Medical and Sanitary Reports from British Colonies, Protectorates and Dependencies.

(ISSUED ANNUALLY.)

Back Supplements can be supplied as follows :—

Dec. 1931	SUPPLEMENT	dealing	with	the	Annual	Reports for 1929	Price 2s. 6d. net.
Oct. 1932	"	"	"	"	"	1930.	Price 2s. 6d. net.
Oct. 1933	"	"	"	"	"	1931.	Price 5s. 0d. net.
Dec. 1934	"	"	"	"	"	1932.	Price 5s. 0d. net.
Nov. 1935	"	"	"	"	"	1933.	Price 7s. 6d. net.
Oct. 1936	"	"	"	"	"	1934.	Price 7s. 6d. net.
Nov. 1937	"	"	"	"	"	1935.	Price 7s. 6d. net.
Nov. 1938	"	"	"	"	"	1936.	Price 7s. 6d. net.
Nov. 1939	"	"	"	"	"	1937.	Price 7s. 6d. net.
Dec. 1940	"	"	"	"	"	1938.	Price 7s. 6d. net.

Publication of the later Supplements is temporarily in abeyance.

BULLETIN OF HYGIENE

containing classified summaries and reviews of publications on all branches of public health and preventive medicine.

(ISSUED MONTHLY.)

Subscription rate (in advance) : 21 shillings per annum post free. The subscription runs from January to December. Single numbers 2s. 6d. each.

ORDERS and SUBSCRIPTIONS may be sent direct to the

BUREAU OF HYGIENE AND TROPICAL DISEASES,
Keppel Street,
Gower Street,
London, W.C.1

or through any bookseller.

Cheques and Postal Orders should be made payable to the "Bureau of Hygiene and Tropical Diseases," and crossed "Westminster Bank Ltd."

The Bureau has from time to time obtained, by purchase or otherwise, copies of journals or monographs for its correspondents. In view of the difficulties which the ordinary agent meets in carrying out commissions of this kind, the Bureau is prepared to do its best to obtain such publications or photogram copies of particular papers, for any of its subscribers. Out-of-pocket expenses will be met by the applicant, who should state the amount he would be prepared to pay for the journals or monographs or photogram copies required, and, when possible, send a money order with his application or a reference to an agent who will meet the cost incurred.